Bulletin of the British Museum (Natural History)

Entomology series Vol 46 1983

British Museum (Natural History)
London 1983

Dates of publication of the parts

No 1	28 April 1983
No 2	26 May 1983
No 3	28 July 1983
No 4	25 August 1983

ISSN 1524–6431

Printed in Great Britain by Henry Ling Ltd, at the Dorset Press, Dorchester, Dorset

Contents

Entomology Volume 46

Bulletin of the
British Museum (Natural History)

The generic and tribal classification of spore-feeding Thysanoptera (Phlaeothripidae: Idolothripinae)

L. A. Mound & J. M. Palmer

Entomology series
Vol 46 No 1 28 April 1983

The *Bulletin of the British Museum* (*Natural History*), instituted in 1949, is issued in four scientific series, Botany, Entomology, Geology (incorporating Mineralogy) and Zoology, and an Historical series.

Papers in the *Bulletin* are primarily the results of research carried out on the unique and ever-growing collections of the Museum, both by the scientific staff of the Museum and by specialists from elsewhere who make use of the Museum's resources. Many of the papers are works of reference that will remain indispensable for years to come.

Parts are published at irregular intervals as they become ready, each is complete in itself, available separately, and individually priced. Volumes contain about 300 pages and several volumes may appear within a calendar year. Subscriptions may be placed for one or more of the series on either an Annual or Per Volume basis. Prices vary according to the contents of the individual parts. Orders and enquiries should be sent to:

Publications Sales,
British Museum (Natural History),
Cromwell Road,
London SW7 5BD,
England.

World List abbreviation: *Bull. Br. Mus. nat. Hist.* (Ent.)

The Entomology series is produced under the general editorship of the
Keeper of Entomology: Laurence A. Mound
Assistant Editor: W. Gerald Tremewan

ISSN 0524-6431

British Museum (Natural History)
Cromwell Road
London SW7 5BD

Entomology series
Vol 46 No 1 pp 1–174

Issued 28 April 1983

The generic and tribal classification of spore-feeding Thysanoptera (Phlaeothripidae: Idolothripinae)

L. A. Mound & J. M. Palmer

Department of Entomology, British Museum (Natural History), Cromwell Road, London SW7 5BD

Contents

Synopsis

In this paper 154 genus-group names are recognised as available in the subfamily Idolothripinae, including six new genera. However, 75 of these names are here placed in synonymy, including 36 new generic synonyms, and one genus was unavailable for study. Keys are provided to the 78 remaining genera, based on a study of more than 480 of the 600 species listed here in this group. In addition, a further 200 species-group names are listed in synonymy, including eight new synonyms, and 17 new species and 110 new combinations are established. These taxa are arranged into two tribes and nine sub-tribes, with eight family-group names being placed in synonymy. Moreover, 26 generic names are transferred from the Idolothripinae to the subfamily Phlaeothripinae and placed in two newly recognised tribes, the Apelaunothripini with two genera and 12 species, and the Docessissophothripini with nine genera and 99 species. Decisions on the Docessissophothripini are based on the study of 44 species, and include 13 new generic synonyms, two new specific synonyms and 69 new combinations. Various aspects of the biology, distribution and structure of spore-feeding thrips are discussed, where these seem relevant to problems of constructing a phylogenetic classification.

Bull. Br. Mus. nat. Hist. (Ent.) **46**(1): 1–174

Issued 28 April 1983

Introduction

The family Phlaeothripidae, the sole family in the Thysanoptera sub-order Tubulifera, comprises about 2700 described species (Mound *et al.*, 1980). Members of this family are structurally uniform, although diverse in superficial appearance and with a wide range of biologies. Probably about half of them feed on leaves of green plants, in tropical countries often inducing galls (Ananthakrishnan, 1978), although in temperate regions phlaeothripids are most commonly observed in the flowers of Compositae and Gramineae (Mound *et al.*, 1976). A number of often unrelated species are predatory on other small arthropods. However, almost half of the phlaeothripid species are associated with fungi – under bark, on dead twigs and branches, or in leaf litter – some feeding on spores but the majority feeding on hyphae or possibly the external digestion products of fungal decay. This paper concerns the classification of those species which feed on fungal spores, most of which comprise the holophyletic, worldwide, sub-family Idolothripinae.

Existing classifications of Phlaeothripidae derive largely from two publications by Priesner (1949: 1961) and these in turn are derived in part from earlier studies by Karny (1921*a*; 1925). Unfortunately, the tradition of work throughout this period often involved acceptance of previously published taxa without further re-examination of the specimens involved. Thus, the key to genera of the world by Priesner (1949) does not indicate which genera he was unable to study personally, although it is evident that parts of the key are based solely on published descriptions. This is also true of Priesner's 1961 classification, which is reproduced almost unmodified by Ananthakrishnan (1969*d*) and Jacot-Guillarmod (1978). This approach could only produce a typological classification, that is a classfication emphasising the importance of single characters. Moreover, characters found to be of use in classification by later workers are not available in the descriptions of earlier taxa, with the result that spurious comparisons are often made.

Stannard (1957) broke with this tradition by personally examining a wide range of phlaeothripid taxa. His outstanding analysis of the North American genera set entirely new standards, by demonstrating a range of previously unobserved characters and by clearly introducing the concept of evolutionary relationships into the systematics of the family. Following this lead, Mound (1974*b*) re-examined almost all of the 100 species comprising the *Nesothrips* genus-group, thus producing a revised generic classification, and Palmer & Mound (1978) redefined a further eight genera from the Oriental region having examined the 60 species concerned. Few other workers have ever examined more than a small percentage of described taxa, and because descriptions often have a low information content (comprising colour and silhouette characters mainly) the systematic confusion is considerable. The objectives of the present study were therefore:

1, to examine the type-species of all genera of Idolothripinae (sensu lato);

2, to examine as many species as possible described in or referred to this group (together with any relevant species described in the Phlaeothripinae), and also to examine more recently collected unidentified material;

3, to try to recognise clusters of related species and, from these presumably holophyletic groupings, to construct a new classification at genus level and above based on phylogenetic rather than typological principles;

4, to communicate this revised classification in the form of an illustrated key to genera.

The first of these objectives was achieved almost completely; only one genus remained unstudied. The second objective was also achieved in that 75 per cent of the known species were studied; those not examined are indicated in the lists of species under each genus by an asterisk (*). The third objective has been achieved only partially; as discussed below, the authors have frequently sacrificed phylogenetic principles to traditional classificatory expediency at both tribal and generic levels. Formal diagnoses are not given for most genera, although brief comparative notes are given for each genus to supplement the key, and at least one species of each genus is illustrated.

Acknowledgements and depositories

The authors wish to express their gratitude for the kind co-operation and forbearance of many colleagues throughout the world, without which this study could not have been completed. We gratefully acknowledge the help of the curators at all the collections listed below, but Steve Nakahara of Washington, Shuji Okajima of Tokyo and Annette Walker of Auckland have been particularly generous in providing frequent advice, information and specimens. Comprehensive taxonomic studies are dependent on co-operation between workers of differing views, and we are pleased to acknowledge the debts we owe to so many other biologists.

AMG	Albany Museum, Grahamstown, South Africa
ANIC	Australian National Insect Collection, C.S.I.R.O., Canberra, Australia
BCIQ	Bureau of Commodity Inspection and Quarantine, Taipei, Taiwan
BCM	Prof. A. Bournier collection, Ecole Nationale Supérieure Agronomique, Montpellier, France
BMNH	British Museum (Natural History), London, U.K.
BPBM	Bernice P. Bishop Museum, Honolulu, Hawaii
CAS	California Academy of Sciences, San Francisco, U.S.A.
DART	Department of Agricultural Research, Taipei, Taiwan
DEI	Deutsches Entomologisches Institut, Eberswalde, East Germany
FSAC	Florida State Arthropod Collection, Dept. of Agriculture, Gainesville, U.S.A.
INHS	Illinois Natural History Survey, Urbana, U.S.A.
MACN	Museo Argentino de Ciencias Naturales Bernardino Rivadavia de Buenos Aires, Argentina
MDA	Museu do Dundo, Angola
MLPA	Museo de la Plata, Argentina
MNHN	Muséum National d'Histoire Naturelle, Paris, France
MNHO	Osaka Museum of Natural History, Japan
MRAC	Musée Royal de l'Afrique Centrale, Tervuren, Belgium
NCIP	South African National Insect Collection, Pretoria, South Africa
NIAT	National Institute of Agricultural Science, Tokyo, Japan
NMB	Naturhistorisches Museum, Basel, Switzerland
NMG	Naturhistoriska Museum, Göteburg, Sweden
NMV	Naturhistorisches Museum, Vienna, Austria
NRS	Naturhistoriska Riksmuseet, Stockholm, Sweden
NZAC	New Zealand Arthropod Collection, D.S.I.R., Entomology Division, Auckland, New Zealand
OCT	Dr Shûji Okajima Collection, Tokyo Agricultural University, Japan
QMB	Queensland Museum, Brisbane, Australia
RPAESIC	Río Piedras Agricultural Experimental Station Insect Collection, Argentina
SMF	Senckenberg Museum, Frankfurt, West Germany
TM	Természettudományi Múzeum (Hungarian Natural History Museum), Budapest, Hungary
TNA	Prof. T. N. Ananthakrishnan, Loyola College, Madras, India
UNAM	Universidad Nacional Autonoma de Mexico, Mexico, D.F., Mexico
USNM	United States National Museum of Natural History, Washington, D.C., U.S.A.
ZMB	Zoologisches Museum an der Humboldt-Universität zu Berlin, East Germany

Problems in constructing classifications

Biologists construct classifications for two major purposes: firstly to provide an identification and data storage and retrieval system, secondly to reflect wherever possible those evolutionary relationships presumed to exist between different taxa. These two purposes, although apparently independent, are often closely inter-related, because a classification derived from evolutionary relationships has the potential for yielding further biological information whereas a typological classification based solely on superficial resemblances has no such potential. Some Thysanoptera specialists have claimed that it is not possible to ascertain evolutionary pathways, and therefore a phenetic classification is the proper practical solution. However, none of them

follows such an extreme attitude to its logical conclusion, e.g. by placing all wingless forms in one group and all winged forms in another, and most classifications are an uneasy and unexplained mixture of phenetics and phylogenetics. The present authors have considered many of the problems involved in the production of phylogenetic classifications of Thysanoptera (Mound *et al.*, 1980; Mound & Palmer, 1981), and have attempted to point out areas where our assumptions have least justification. We accept that a completely phylogenetic classification of this group is not yet possible, but our objective has been to emphasise the presumed underlying evolutionary relationships between taxa, in contrast to most of our predecessors who have emphasised the often startling, but frequently superficial, differences which are readily observed.

Character inheritance

A phylogenetic classification is based on the recognition of two or more taxa jointly exhibiting one or more derived characters – apomorphies – not found in other taxa. Two such taxa sharing an apomorphy not exhibited by related taxa (and each itself characterised by a further unique apomorphy), may be regarded as holophyletic sister-groups. That is, they are derived from a single common ancestor, and moreover include all extant taxa which have evolved from that ancestor. Shared primitive characters – plesiomorphies – although indicating relationship cannot be used to define a natural evolutionary group (Hennig, 1966).

Unfortunately, this strictly logical approach is subject to practical difficulties when applied to some groups of organisms (Gauld & Mound, 1982). It is often possible to characterise one particular group through the presence of one or more apomorphies, but the sister-group may remain unclear (Greenwood, 1980). In such instances the true sister-group appears to lie within some residual group that is itself imperfectly characterised. Moreover, the strictly logical approach assumes that an apomorphy will find expression in *all* species in a holophyletic group, although this would not be expected from current genetical theory (Maynard Smith, 1975) and is contrary to observation in some groups of insects (Gauld & Mound, 1982).

Within any particular evolutionary lineage it is not unusual to observe a *tendency* for a particular character to be developed (Stys, 1967), although not all species will exhibit the character and its development is not a direct measure of evolutionary relationship. Such a character, although inherited by all members of the lineage, fails to be expressed in some species (even in some individuals of a species) probably because its ontogenetic development is inhibited by some other aspect of the genotype. Similarly, reversal of a character state during evolution is apparently common in Thysanoptera, e.g. antennal segment number (Mound & Palmer, 1981). Unfortunately, many apomorphies in this group of insects involve losses (e.g. loss of metathoracic sternopleural sutures or praepectus) or reductions (e.g. number of antennal sense cones or sternal discal setae), and such characters are more likely to have evolved more than once than a new complex structure. This irregular pattern of character inheritance, involving reversal and recurrent reductions in structures, may be a reflection of the ecology of the group as discussed below under patterns of speciation.

Further complications of character inheritance in Phlaeothripidae result from sex-linkage and allometry. In fungus-feeding phlaeothripids, including spore-feeding idolothripines, males are often oedymerous (large) and develop a range of structures not found in females. For example, *Mecynothrips* and *Elaphrothrips* males have tubercles or setae on the forelegs not found in females, *Bactrothrips* males usually have abdominal tubercles which do not occur in females, and *Gastrothrips, Diceratothrips* and *Macrothrips* all include species in which males may be oedymerous or gynaecoid (female-like). This relationship is reversed in *Machatothrips*, however, in which females exhibit the secondary sexual characters. Moreover, in gall-forming phlaeothripines, males are usually small and constant in size but females are variable; large females may look quite different from small females due to enlargement of the forelegs and pronotum. Similar phenomena can be associated with wing reduction, the wingless morph again usually being female.

The difficulty for classification arises particularly when related evolutionary lineages involve

emphasis on different morphs; that is one lineage may emphasise male-ness whereas another emphasises female-ness. For example, *bicornis*, the most common species of *Diceratothrips*, is also the largest member of the genus with the greatest sexual dimorphism. The other members of *Diceratothrips* tend to have both sexes similar in structure to female *bicornis*, moreover, these females are structurally similar to females of *Sporothrips*. The ontogenetic threshold at which various characters associated with wing length or sexuality may be expressed will itself be liable to variation during evolution, and could well be independent of close phylogenetic relationships. Emphasis by taxonomists on striking differences between males of different species will tend to increase the number of 'genera' without producing any increased understanding of the underlying evolutionary relationships.

Zoogeography

The observed geographic distribution of natural groups of organisms can provide additional evidence in support of a classification. For example, in the classification adopted here the Hystricothripina is predominantly New World and the Idolothripina predominantly Old World. Moreover, the Macrothripina is largely Oriental and the Pygothripina predominantly Austro–Oriental. Such distribution patterns reassure the systematist that he is probably recognising real evolutionary groups. However, natural distribution patterns have been disrupted in many instances by human trading. For example, *Nesothrips propinquus* is now found at most points along the old shipping route between Britain and New Zealand and was probably distributed in hay and straw; *Nesothrips lativentris*, which is frequent on dead palm leaves and coconuts, is now widespread in the tropics; other species appear to have been transported across the Atlantic by the slave trade, or across the Indian Ocean by even earlier shipping (Mound, 1974*b*). Moreover, since many species are known only from single individuals or single samples it is probable that recognition of further synonymy will increase the number of species known to have been distributed by man (Mound & Walker, 1982).

Patterns of speciation

There is little evidence that most spore-feeding thrips exhibit any particular host specificity, although there tends to be some correlation between stylet diameter and the size of spores found in the gut, and a few species are found in association with particular plants, e.g. *Sporothrips* on dead leaves of Palmetto palms in Florida. Not only are two or more congeneric species found together quite frequently, but such species are sometimes widespread, e.g. *Elaphrothrips* species (Palmer & Mound, 1978). The extensive distributions of such species are probably facilitated by the availability of suitable fungal spores widespread on dead branches and in leaf littler. Palmer & Mound (1978) interpreted the Oriental *Elaphrothrips* species as structurally variable and behaviourally vagile with extensive and broadly overlapping geographical ranges. In contrast, Dr R. Johansen is currently describing numerous species of *Elaphrothrips* from Mexico, thus implying that the biology of these insects is different in the Neotropics. Spore-feeding species of low vagility (low dispersive ability) may develop clines, such as that of *Allothrips megacephalus* across North America (Mound, 1972*a*). Unfortunately, although at times it may be possible to relate different biologies to different patterns of speciation, most species are based on few specimens (e.g. *Bactrothrips*) and so the concept of species is itself often poorly defined.

Commenting on the large number of co-existing congeneric species of fungus-feeding thrips in leaf litter in southern Brazil, Mound (1977) suggested a possible relationship to a seasonal excess of available food, and subsequent reduction in competition between species. Such a reduction in competition, and consequent reduction in selection pressures on incipient species, may be related to the frequency of homoplasy (reversal and parallelism) in character inheritance within these thrips (Gauld & Mound, 1982). Host specific phytophagous thrips will almost certainly be subject to greater selection pressures in dividing up available resources, because they must develop the necessary behaviour patterns to find and respond to their particular niches. Unfortunately, the ecology, and hence speciation patterns, associated with this type of

evolutionary strategy, involving competition and resource partitioning, is more fully investigated than the ecological and evolutionary strategies of non-specific leaf litter insects. If it should prove correct that the available resources in leaf litter are periodically in excess of the demands of the total arthropod fauna, then the classical evolutionary model involving niche separation and competition may be inappropriate for these small organisms with a short life cycle.

Characters studied

Head

Head shape is often useful in recognising relationships between taxa, e.g. relative length/breadth, constriction behind eyes or basally, prolongation in front of eyes, elevation in mid-line. However, shape is readily distorted by cover-glass pressure on specimens mounted onto microscope slides, the degree of distortion being particularly remarkable when the posterior half of the head is deep dorso-ventrally.

Maxillary stylets are broader (5–10 μm) in Idolothripinae than in most Phlaeothripinae (2–3 μm), but are intermediate in width (3–6 μm) in members of the phlaeothripine tribes Apelaunothripini and Docessissophothripini. The plesiomorphic position of the stylets in Idolothripinae is probably deeply retracted and parallel medially (Figs 2–11), the derived condition being wide apart and low in the head (Figs 134–144). However, polarity of this character is confused by homoplasy, both reversal (*Zeuglothrips*, Fig. 342) and parallelism (cf. *Ozothrips* and *Nesothrips*, Figs 13, 142). The stylets of Docessissophothripini are sometimes exceptionally long and convoluted (Figs 385–390).

Maxillary guides are thickened internal structures associated with the stylets of Phlaeothripinae. In Docessissophothripini they are large bowed structures (Figs 385–390), and in *Haplothrips* species they form a characteristic bridge (Mound *et al.*, 1976). However, in Idolothripinae these structures are developed only in some Pygothripina.

Mouth cone shape is frequently stressed in older descriptions, but is of limited systematic value. The apparent shape depends largely on whether the mouth cone is directed posteriorly (pointed) or ventrally (rounded).

Maxillary palps are two-segmented and generally rather large in idolothripines, but in Allothripina the terminal sensorium is often enlarged giving the appearance of a third segment (Fig. 77).

Compound eyes, although rounded and multifaceted in most species, are sometimes reduced to a few facets (*Anaglyptothrips*, Fig. 103) or prolonged ventrally (*Bolothrips*, Fig. 94). Reduction in facet number is usually associated with aptery, and ventral prolongation of the eyes seems to be correlated with the grass-living habit.

Ocelli are almost always present in macropterae, usually absent in apterae, and frequently reduced in micropterae. Thus, although there is a positive correlation between presence of wings and presence of ocelli, the development of these two structures is controlled independently. When the head is prolonged in front of the eyes, the fore ocellus may be unusually distant from the hind ocelli.

Setae are developed on the head surface in a fairly restricted pattern. There are usually about three pairs of setae associated with the ocelli, and either the post-ocellars or preocellars are frequently enlarged. Most species have a pair of major post-ocular setae; a few have two pairs, the second arising on the cheeks, or medially, or on the vertex. Many Idolothripinae have a series of stout setae on the cheeks.

Antennal structure is important in deducing relationships between taxa. The plesiomorphic number of antennal segments in Phlaeothripidae is eight (Mound *et al.*, 1980). However, Idolothripinae may have evolved from species with only seven segments, because the subgroups which are here regarded as least advanced (Pygothripina and Allothripina) tend to have that number. If this is so, then the number of antennal segments has undergone reversal to eight and reduction to seven (or less) several times. Similarly the plesiomorphic sense cone formula in idolothripines is considered to be two on III and two on IV, but in most species the number of sense cones on IV is doubled. The condition of three sense cones on IV has probably evolved

more than once, being found in *Cryptothrips* (Pygothripina), *Bolothrips* (Compsothripina) and *Gastrothrips* (Gastrothripina). The relative lengths of antennal segments have been used frequently for defining species, but caution is required in using such ratios because segment lengths are sometimes affected by allometric growth.

Prothorax

Pronotal shape is often affected by sex and morph correlated allometry, and is not usually significant at genus-level (see *Diceratothrips*), although some groups exhibit a tendency for the anterior margin or median line of the pronotum to be thickened.

Epimeral sutures are usually present posterolaterally on the pronotum, but these are incomplete or fused in some taxa.

Setae are borne in a very regular pattern on the pronotum, there being five pairs of major setae in most species – antero-marginals (am), antero-angulars (aa), mid-laterals (ml), epimerals (epim) and postero-angulars (pa). The two anterior pairs are often shorter than the other three; only rarely are these setae undeveloped (*Anaglyptothrips*).

Praepectal plates (or praepectus) are a pair of small sclerites on the prosternum, arising in front of the major probasisternal plates (Figs 140, 143), but they are often reduced (Fig. 372) or absent (Fig. 371).

Pterothorax

The *mesonotum* in macropterae often bears a pair of major setae laterally. In apterae this sclerite is reduced and in extreme instances fused to the metanotum. The mesothoracic spiracle is situated on the anterior angles of the segment and is sometimes surrounded by an area of specialised sculpture (e.g. *Dinothrips*). Ventrally, the mesopraesternum is usually a boat-shaped sclerite but is often reduced and occasionally absent.

The *metanotum* often bears a pair of stout setae medially, but the sclerite is reduced and transverse in apterae. The metathoracic sternopleural sutures, which curve posteriorly from the mid-coxal cavities (Fig. 100), are regarded as a plesiomorphic character which has been lost in the more advanced subgroups of Idolothripinae (Fig. 99). This derived condition may have developed more than once, because the suture is variable in position, sometimes reduced in length, or so slender as to be almost obliterated (*Carientothrips*). Although generally constant within groups, the sternopleural suture is variable within a few species (e.g. *Nesothrips propinquus*).

The *katepisternum* and *anepisternum* of the metathorax are swollen in some groups (Hystricothripina) and the anepisternal suture is short (Figs 353–355). However, the plesiomorphic condition seems to be represented by a complete suture (Fig. 127), although these sclerites are often eroded in reduced or apterous forms (Figs 21–22).

The *forewings* bear a fringe of cilia although, unlike Terebrantia, these cilia do not arise from sockets; there are no true longitudinal veins and the surface of the wing does not bear microtrichia (Mound *et al.*, 1980). On the distal hind margin the forewings often bear duplicated cilia, ranging in number from one to almost one hundred. Idolothripines show less variation in wing length than phlaeothripines; micropterae are rare and hemimacropterae unrecorded, most species being macropterous and/or apterous.

The *forelegs* often bear a small or large tarsal tooth in one or both sexes. Similarly the foretibiae, forefemora and even the forecoxae may bear one or more tubercles in different genera. These tubercles, and particularly the swelling of the forefemora, are subject to allometric growth patterns, and they are also usually sex-linked. Moreover, the production of tubercles may recur in particular groups of related genera, e.g. many species of Macrothripina have a small tubercle at the inner apex of the foretibiae in both sexes (Figs 220–221).

Abdomen

Pelta is the term applied to the first abdominal tergite. In most species this tergite is reduced to a small median tergite, only in *Allidothrips* is it completely transverse (Fig. 64). In some

Hystricothripina the setae on the pleurites of the first segment have migrated onto the pelta (Figs 375–384), and in some Pygothripina the pelta is eroded posteromedially (Figs 36–37).

Wing-retaining setae are developed sub-medially on tergites II–VII of most macropterae. These setae are usually sigmoid in shape (Fig. 294), but are sometimes almost straight (Fig. 326) or even flattened (Fig. 369). The plesiomorphic condition for the subfamily Idolothripinae is here interpreted as involving only one pair of wing-retaining setae on each tergite as in Pygothripini (Fig. 43). The condition with two pairs of such setae as in most Idolothripini is considered apomorphic, and the three or more pairs found in *Mecynothrips* species (Fig. 297) is particularly advanced. Micropterae and apterae have the wing-retaining setae reduced or absent.

Tergite IX setae are important in the recognition of the two subfamilies of Phlaeothripidae. The males of almost all phlaeothripine species have the submedian pair of setae (B_2) on tergite IX short and stout, whereas males and females of all Idolothripinae have these setae as long as the dorsal (B_1) and lateral (B_3) pairs.

The *tube* is the most characteristic structure of Phlaeothripidae, abdominal segment X being entirely tubular with the anus emerging terminally and the genital ducts between segments IX and X. The tube is greatly swollen in several genera of Pygothripina and Diceratothripina. In many Idolothripini, as well as in *Cleistothrips* (Pygothripina) and *Campulothrips* (Diceratothripina), the tube bears prominent lateral setae. The base of the tube is emarginate ventrally in males, but completely cylindrical in females.

Sternal glandular areas are rarely developed in Idolothripinae, the only known species being in the Macrothripine genera *Dichaetothrips*, *Peltariothrips* and *Tarassothrips*. Glandular areas are frequently developed in the Phlaeothripinae, however – on the median sternites in both sexes of many Plectrothripini (Okajima, 1981), on the median sternites in the males of most species of Docessissophothripini (p. 90), and on the eighth sternite in the males of many other Phlaeothripinae.

Sternal discal setae are usually developed as a single transverse row medially on each sternite, but they are duplicated in some species (*Actinothrips*) or reduced in others (*Priesneriella*).

Family-group classification of Idolothripinae

Two sub-families are recognised in the family Phlaeothripidae, the Phlaeothripinae and the Idolothripinae. This latter group, the spore-feeding thrips, was defined in its modern sense (under the name Megathripinae) by Stannard (1957), who characterised it by the *presence* of broad maxillary stylets and the *absence* in males both of sternal glandular areas and of short stout B_2 setae on tergite IX. The latter characteristic is constant throughout the Idolothripinae as defined in the present paper; however, three species of Macrothripina are now known which appear to have sternal glandular areas in males and/or females (see *Dichaetothrips*, *Peltariothrips* and *Tarassothrips*).

Broad maxillary stylets are a functional adaptation to feeding on fungal spores, but although the sub-family Idolothripinae appears to be a holophyletic group the characteristic of broadened stylets has also evolved in several groups of Phlaeothripinae. Two such groups, the tribes Apelaunothripini and Docessissophothripini, are discussed in this paper (p. 88) because they were treated as idolothripines by Priesner (1961). In addition, species of the quite unrelated genus *Lissothrips*, associated with lichens and possibly mosses, also have rather broad stylets. Moreover, a Neotropical species-group of *Liothrips* is known in which the males may be mistaken for idolothripines in that they lack sternal glandular areas and have three pairs of elongate setae on the ninth tergite (Mound, 1974*b*: 182).

A further negative characteristic of idolothripine species is the apparent absence of maxillary guides, with the exception of a few species of Pygothripina, particularly from New Zealand.

Table 1 indicates the family-group names in the Idolothripinae, and it must be emphasised that according to the *Code of Zoological Nomenclature* (1961) all categories of family-group names are co-ordinate. The various names listed in this table must therefore be employed for groups containing their appropriate nominal taxon in order of date priority. Thus Mound

Table 1 Family-group names in Idolothripinae

Families
Idolothripidae Bagnall, 1908
Hystricothripidae Karny, 1913*a*
Megathripidae Karny, 1913*a*
Pygothripidae Hood, 1915

Subfamilies
Bactrothripinae Karny, 1919
Compsothripinae Karny, 1921*a*
Cryptothripinae Karny, 1921*a*
Macrothripinae Karny, 1921*a*
Diceratothripinae Karny, 1925*c*

Tribes
Emprosthiothripini Priesner, 1961
Pygidiothripini Priesner, 1961

Subtribes
Allothripina Priesner, 1961
Atractothripina Priesner, 1961
Gastrothripina Priesner, 1961
Zeugmatothripina Priesner, 1961
Hartwigia Stannard, 1976

Table 2 Current family-group classification of Idolothripinae (Jacot-Guillarmod, 1978)

IDOLOTHRIPINI
Idolothripina [32 genera]
Atractothripina [1 genus]
Hystricothripina [3 genera]
Megathripina [2 genera]
Apelaunothripina [2 genera]

CRYPTOTHRIPINI
Cryptothripina [22 genera]
Allothripina [6 genera]
Gastrothripina [13 genera]
Diceratothripina [18 genera]

COMPSOTHRIPINI
Compsothripina [3 genera]
Hartwigia [1 genus]

EMPROSTHIOTHRIPINI [1 genus]

PYGIDIOTHRIPINI [1 genus]

PYGOTHRIPINI [1 genus]

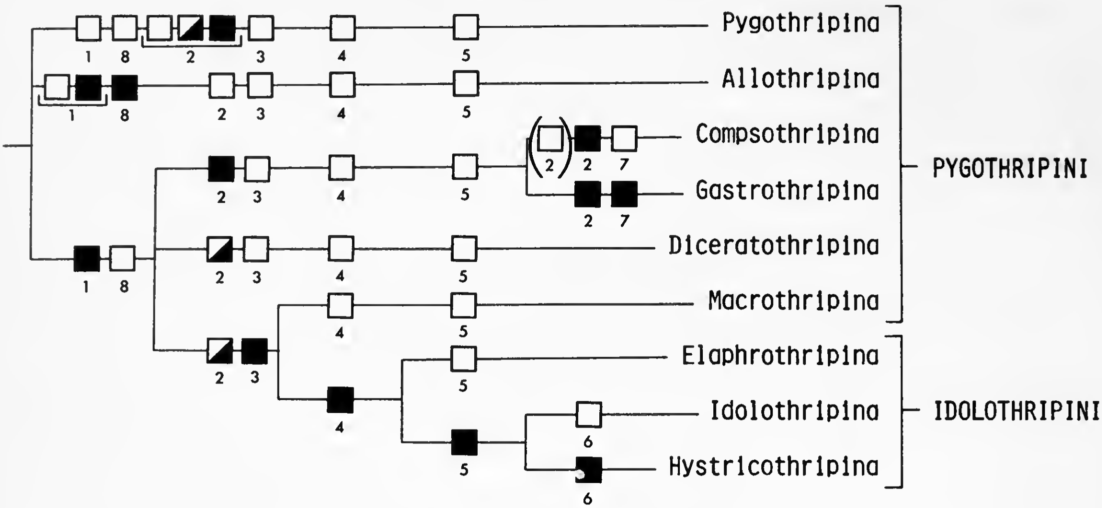
Table 3 Revised family-group classification of Idolothripinae

PYGOTHRIPINI Hood, 1915
PYGOTHRIPINA Hood, 1915
Cryptothripinae Karny, 1921*a*
Emprosthiothripini Priesner, 1961
ALLOTHRIPINA Priesner, 1961
Pygidiothripini Priesner, 1961
COMPSOTHRIPINA Karny, 1921*a*
GASTROTHRIPINA Priesner, 1961
DICERATOTHRIPINA Karny, 1925*c*
MACROTHRIPINA Karny, 1921*a*

IDOLOTHRIPINI Bagnall, 1908
ELAPHROTHRIPINA subtrib. n.
Hartwigia Stannard, 1976
IDOLOTHRIPINA Bagnall, 1908
Bactrothripinae Karny, 1919
Megathripidae Karny, 1913*a*
HYSTRICOTHRIPINA Karny, 1913*a*
Atractothripina Priesner, 1961
Zeugmatothripina Priesner, 1961

(1974*a*) pointed out that the earliest available name for the spore-feeding thrips is Idolothripidae not Megathripidae which previously had been widely used. Table 2 summarises the family-group classification of Idolothripinae in current use as given by Jacot-Guillarmod (1978), and Table 3 gives the family-group classification (with synonymies) adopted in the present paper.

Only two tribes are recognised by the present authors: Idolothripini in which species never have metathoracic sternopleural sutures, and (with the exception of many Hystricothripina, as well as *Elaphrothrips antennalis*) have two pairs of tergal wing-retaining setae; and Pygothripini which have only one pair of wing-retaining setae on each tergite (except for two species of *Phaulothrips*) and which usually have well-developed metathoracic sternopleural sutures (except Macrothripina, some Compsothripina and a few Diceratothripina). However, these two tribes are probably not sister-groups. Idolothripini may be holophyletic, but its only possible sister-group on present evidence is the sub-tribe Macrothripina in the Pygothripini (Fig. 1). Despite this, the two tribes are retained here for traditional classificatory convenience.



1. Maxillary stylets long □ ; short ■
2. Antennal segment IV with 2 sense cones □ ; 4 sense cones ◩ ; 3 sense cones ■
3. Metathoracic sternopleural sutures present □ ; absent ■
4. Tergites with 1 pair □ ; 2 pairs ■ wing retaining setae
5. Tube glabrous □ ; hairy ■
6. Praepectal plates present □ ; absent ■
7. Antennal sense cones slender □ ; stout ■
8. Maxillary palp sensoria small □ ; large ■

Fig. 1 Summary diagram of classification and character-state distribution in suprageneric taxa of Idolothripinae.

Within the Idolothripini three sub-tribes are recognised. Idolothripina and Hystricothripina, the species of which bear pronounced setae on the margins of the tube, are regarded as sister-groups, and these two together possibly represent the sister-group of the third sub-tribe, Elaphrothripina. Priesner's group Atractothripina is synonymised with Hystricothripina, and Megathripina with Idolothripina. Moreover, Apelaunothripina is recognised as a tribe in the Phlaeothripinae (p. 89).

The second tribe, Pygothripini, corresponds largely with the group previously known as Cryptothripini (together with the four other smaller tribes listed in Table 2), with the major exception of a long series of genera removed from Cryptothripina to the Phlaeothripinae – Docessissophothripini (q.v., p. 89 & Table 5).

Within the Pygothripini six sub-tribes are recognised in the present re-classification (Table 3). The Pygothripina, which is characterised primarily by plesiomorphies, probably represents the closest living approximation to the 'proto-idolothripine' condition: stylets long and close together medially; antennae often 7-segmented, usually with two sense cones on segments III

and IV; metathoracic sternopleural and anapleural sutures present; pelta with slender, wide lateral wings. However, within this group there are species with one or other apomorphic characters found otherwise only in comparatively unrelated, more advanced groups, e.g. *Cleistothrips* has the tube hairy as in Idolothripina and Hystricothripina; *Cryptothrips* has three sense cones on antennal segment IV as in Gastrothripina and *Bolothrips* (Compsothripina). Thus certain of the most advanced characteristics seem to have made their first appearance in certain of the least advanced genera. The alternative explanation, involving placing *Cleistothrips* in Idolothripini on the basis of this one character, the hairy tube, is contrary to the information provided by other structural characters and makes no sense zoogeographically.

The sub-tribe Allothripina comprises a small group of closely related species, derived from Pygothripina but with a remarkable terminal sensorium on the maxillary palps. Gastrothripina includes most idolothripine species with three short, stout sense cones on the fourth antennal segment. *Bolothrips* species, here placed in Compsothripina, also have three sense cones on this segment, but in this genus the sense cones are slender. The Compsothripina, as interpreted here, comprises a series of grass-living species in *Bolothrips* and related genera, together with the ant-mimicking *Compsothrips*-group. As discussed below (p. 34), intermediates between these two genera are found in the Mediterranean region. Although both the Gastrothripina and Compsothripina are each interpreted here as holophyletic groups, their out-group relationships are unclear.

The Diceratothripina is a large group, comprising those Pygothripini with metathoracic sternopleural sutures but with the maxillary stylets wide apart and four (rarely two) sense cones on the fourth antennal segment. This sub-tribe includes a large number of Austro-Oriental and Pacific species in the *Nesothrips*-group, a few Neotropical species in the *Diceratothrips*-group, together with an ill-defined pan-tropical genus *Neosmerinthothrips*.

Finally the Macrothripina comprises most of the Pygothripini species which lack metathoracic sternopleural sutures. This group is almost entirely Oriental with a few species in Africa, although the two species of *Diplacothrips* are known only from South America. This is a very clearly defined group; its relationship to the other Pygothripini is unclear, but Macrothripina may be the sister-group of the Idolothripini on the basis of the apomorphy – loss of sternopleural sutures.

Key to subtribes of Idolothripinae

N.B. This key is intended only to summarise the relationships discussed above based on the morphological characters indicated; because of individual variation it is not intended to be a practical key for routine identifications.

1 Metathoracic sternopleural sutures absent (cf Fig. 99); tergites usually with two or more pairs of wing-retaining setae (except *Anactinothrips* and *Elaphrothrips antennalis*) (Figs 294–299) and/or tube bearing long lateral setae (Fig. 374) (**IDOLOTHRIPINI** (p. 62)) 2

– Metathoracic sternopleural sutures present or absent (Figs 97–100); tergites each with only one pair of wing-retaining setae (except two species with well-developed sternopleural sutures); tube never with long lateral setae (except two species with well-developed sternopleural sutures) (**PYGOTHRIPINI** (p. 20)) 4

2 Tube without conspicuous lateral setae; metathoracic anapleural sutures complete (Figs 280–283) .... **ELAPHROTHRIPINA** (p. 62)

– Tube with conspicuous lateral setae; metathoracic anapleural sutures short (Figs 353–355) 3

3 Forewing duplicated cilia well developed; praepectal plates present; tergites each with two pairs of wing-retaining setae: ♂ frequently with one or more pairs of lateral abdominal tubercles (Figs 324–325) .... **IDOLOTHRIPINA** (p. 71)

– Forewing usually lacking duplicated cilia; praepectal plates usually absent; tergites usually each with one pair of wing-retaining setae; ♂ without lateral abdominal tubercles **HYSTRICOTHRIPINA** (p. 80)

4 Metathoracic sternopleural sutures absent; antennal segment IV with four sense cones, these sometimes unusually long; foretibia often with a tubercle near inner apex; head sometimes with an isolated ommatidium-like structure on each cheek (Figs 194–196) **MACROTHRIPINA** (p. 50)
– Metathoracic sternopleural sutures usually present, when absent antennal sense cones short or segment IV with three sense cones 5

5 Terminal sensorium on maxillary palps stout (Fig. 77).......... **ALLOTHRIPINA** (p. 30)
– Terminal sensorium on maxillary palps not unusually stout 6

6 Maxillary stylets wide apart in head but antennal segment IV with three stout sense cones (Fig. 93) .... **GASTROTHRIPINA** (p. 38)
– Not this combination of characters, if three sense cones on IV then these are slender or stylets are close together in the head 7

7 Maxillary stylets wide apart in head, V-shaped; antennal segment IV with four (rarely two) sense cones.......... **DICERATOTHRIPINA** (p. 40)
– Maxillary stylets rarely more than one-third of head width apart; antennal segment IV with 2, 3 or 4 sense cones 8

8 Eyes frequently prolonged ventrally on head, if eyes not prolonged then antennal segment IV with three slender sense cones; maxillary stylets not touching medially in head.......... **COMPSOTHRIPINA** (p. 34)
– Eyes never prolonged ventrally; antennal segment IV with two (rarely three or four) sense cones; stylets usually close together .... **PYGOTHRIPINA** (p. 21)

Genus-group classification of Idolothripinae

The present authors consider a genus, ideally, to comprise a group of species which share a unique apomorphy and which together represent a holophyletic lineage. Within this phylogenetic ideal there seems to us to be no room for the subordinate category of subgenus. We recognise the value of species-groups in defining evolutionary relationships, but do not accord these any status in nomenclature.

Unfortunately, for reasons discussed above in the section concerning problems in constructing classifications, the phylogenetic ideal is difficult to achieve. Only half of the described genera are accepted here (Table 4), mainly because so many monobasic genera have been placed into larger holophyletic groupings. A more strictly phylogenetic classification would probably recognise even fewer genera, particularly in the Hystricothripina. But there is a tradition amongst thysanopterists of considering any unusual character, or character combination, as meriting recognition at generic level, and we are aware that some of our colleagues would prefer to maintain this tradition.

This paper is therefore only a preliminary step toward a phylogenetic classification. We hope that other workers will recognise the value of such an approach, and examine the confused systematics of the rest of the Phlaeothripidae.

The key below includes all 78 idolothripine genera recognised in this revision (Table 4), and is based on a study of all those species indicated under each generic name in the main text. Only one generic name is excluded; the monobasic *Pinaceothrips* Yakhontov (1956) was not available for study and is unrecognisable from its description. The key is by no means easy to use, because of the diversity of species within some genera and the variation found within many species. The present authors themselves regularly experience difficulty in placing an unknown species to genus, and under such circumstances frequently have to reinspect the range of variation exhibited within one or more genera.

Table 4 Generic classification of Idolothripinae

(*Pinaceothrips* Yakhontov, 1956 is unplaced)

Tribe **PYGOTHRIPINI**
- Subtribe **PYGOTHRIPINA**
  - ***CLEISTOTHRIPS*** Bagnall
  - ***CRYPTOTHRIPS*** Uzel
  - ***EMPROSTHIOTHRIPS*** Moulton
  - ***HEPTATHRIPS*** Moulton
    - *Ascania* Faure **syn. n.**
    - *Capnothrips* Zur Strassen **syn. n.**
  - ***OZOTHRIPS*** **gen. n.**
  - ***PELINOTHRIPS*** Mound
  - ***PHAULOTHRIPS*** Hood
    - *Kaleidothrips* Kelly **syn. n.**
    - *Tetraceratothrips* Bagnall
    - *Titanothrips* Karny
  - ***PRIESNERIANA*** Ananthakrishnan
  - ***PYGOTHRIPS*** Hood
    - *Barythrips* Hood & Williams **syn. n.**
    - *Diplochelaeothrips* Moulton **syn. n.**
- Subtribe **ALLOTHRIPINA**
  - ***ALLIDOTHRIPS*** Zur Strassen
  - ***ALLOPISOTHRIPS*** Sakimura & Bianchi
  - ***ALLOTHRIPS*** Hood
    - *Bryothrips* Priesner
  - ***FAUREOTHRIPS*** Priesner
  - ***PRIESNERIELLA*** Hood
    - *Embothrips* Dyadechko
    - *Parallothrips* Hood **syn. n.**
    - *Pygidiothrips* Hood **syn. n.**
  - ***PSEUDOCRYPTOTHRIPS*** Priesner
- Subtribe **COMPSOTHRIPINA**
  - ***ANAGLYPTOTHRIPS*** **gen. n.**
  - ***BOLOTHRIPS*** Priesner
    - *Bolothrips (Botanothrips)* Hood
    - *Boloadelothrips* Moulton **syn. n.**
  - ***COMPSOTHRIPS*** Reuter
    - *Macrothrips* Buffa
    - *Leurothrips* Bagnall
    - *Leptogastrothrips* Trybom
    - *Oedaleothrips* Hood
    - *Myrmecothrips* Watson
    - *Formicothrips* Priesner
  - ***ILLINOTHRIPS*** Stannard
  - ***LOYOLAIA*** Ananthakrishnan
- Subtribe **GASTROTHRIPINA**
  - ***GASTROTHRIPS*** Hood
    - *Goetothrips* Priesner
    - *Isopterothrips* Bagnall **syn. n.**
    - *Paragastrothrips* Zur Strassen **syn. n.**
    - *Percnothrips* Ananthakrishnan **syn. n.**
    - *Pharetrothrips* Priesner **syn. n.**
    - *Probolothrips* Moulton
    - *Syncerothrips* Hood **syn. n.**
- Subtribe **DICERATOTHRIPINA**
  - ***ACALLUROTHRIPS*** Bagnall
    - *Diopsothrips* Hood **syn. n.**
  - ***CAMPULOTHRIPS*** Moulton
  - ***CARIENTOTHRIPS*** Moulton
  - ***DICERATOTHRIPS*** Bagnall
    - *Diceratothrips (Endacnothrips)* Priesner
    - *Eulophothrips* Schmutz
    - *Megalomerothrips* Watson
  - ***ELGONIMA*** Zur Strassen
  - ***NEOSMERINTHOTHRIPS*** Schmutz
    - *Coenurothrips* Bagnall
    - *Galactothrips* Moulton
  - ***NESIDIOTHRIPS*** Mound
  - ***NESOTHRIPS*** Kirkaldy
    - *Oedemothrips* Bagnall
    - *Rhaebothrips* Karny **syn. n.**
  - ***PHACOTHRIPS*** Mound
  - ***PSEUDOEURHYNCHOTHRIPS*** Moulton
  - ***SPOROTHRIPS*** Hood
- Subtribe **MACROTHRIPINA**
  - ***AESTHESIOTHRIPS*** Ananthakrishnan
  - ***CELIDOTHRIPS*** Priesner
    - *Ommatidothrips* Mound
  - ***DIAPHOROTHRIPS*** Karny
    - *Diaphorothrips (Cnemidothrips)* Priesner
  - ***DICHAETOTHRIPS*** Hood
  - ***DIPLACOTHRIPS*** Hood **gen. rev.**
  - ***ETHIROTHRIPS*** Karny
    - *Decothrips* Ananthakrishnan **syn. n.**
    - *Elaphridia* Ananthakrishnan **syn. n.**
    - *Eurynotothrips* Moulton **syn. n.**
    - *Paracryptothrips* Moulton **syn. n.**
    - *Percipiothrips* Ananthakrishnan **syn. n.**
    - *Scotothrips* Priesner **syn. n.**
    - *Uredothrips* Ananthakrishnan **syn. n.**
  - ***HERATHRIPS*** Mound
  - ***ISCHYROTHRIPS*** Schmutz
  - ***MACHATOTHRIPS*** Bagnall
    - *Adiaphorothrips* Bagnall
    - *Cnestrothrips* Priesner
  - ***MACROTHRIPS*** Bagnall
  - ***PELTARIOTHRIPS*** **gen. n.**
  - ***POLYTRICHOTHRIPS*** Priesner
  - ***TARASSOTHRIPS*** **gen. n.**

Tribe **IDOLOTHRIPINI**
- Subtribe **ELAPHROTHRIPINA subtrib. n.**
  - ***ANACTINOTHRIPS*** Bagnall
    - *Lophothrips* Karny
    - *Ophidothrips* Schmutz
  - ***DERMOTHRIPS*** Bagnall
  - ***DINOTHRIPS*** Bagnall
    - *Paxillothrips* Ananthakrishnan
  - ***ELAPHROTHRIPS*** Buffa
    - *Dicaiothrips* Buffa
    - *Elaphridothrips* Priesner

Table 4 cont.

Elaphrothrips (Cradothrips) Ananthakrishnan
Elaphrothrips (Elaphoxothrips) Bagnall
Elaphrothrips (Paraclinothrips) Priesner
Klinothrips Bagnall
Palinothrips Hood **syn. n.**
HARTWIGIA Faure
LAMILLOTHRIPS Bagnall
Hylothrips Priesner **syn. n.**
MALESIATHRIPS Palmer & Mound
MECYNOTHRIPS Bagnall
Acrothrips Karny
Dracothrips Bagnall
Kleothrips Schmutz
Kleothrips (Akleothrips) Priesner
Kleothrips (Synkleothrips) Priesner
Phoxothrips Karny
OPHTHALMOTHRIPS Hood
Derothrips Jacot-Guillarmod **syn. n.**
Fulgorothrips Faure **syn. n.**
Pyrgothrips Karny **syn. n.**
TIAROTHRIPS Priesner

Subtribe **IDOLOTHRIPINA**
BACILLOTHRIPS Buffa
BACTROTHRIPS Karny
Bactrianothrips Bagnall
Bactridothrips Karny **syn. n.**
Caudothrips Karny **syn. n.**
Cervothrips Bagnall **syn. n.**
Eidothrips Bagnall **syn. n.**
Krinothrips Bagnall
CEUTHOTHRIPS Hood
CYLINDROTHRIPS Moulton
EGCHOCEPHALOTHRIPS Bagnall
IDOLOTHRIPS Haliday
Acanthinothrips Bagnall
LASIOTHRIPS Moulton
MEGALOTHRIPS Uzel
MEGATHRIPS Targioni-Tozzetti
Siphonothrips Buffa **syn. n.**
MEIOTHRIPS Priesner
Meiothrips (Aculeathrips) Kudo

Subtribe **HYSTRICOTHRIPINA**
ACTINOTHRIPS Bagnall
Dasythrips Hood **syn. n.**
ATRACTOTHRIPS Hood
AZEUGMATOTHRIPS **gen. n.**
CYPHOTHRIPS Hood
HOLUROTHRIPS Bagnall
HYBRIDOTHRIPS Stannard
HYSTRICOTHRIPS Karny
Zeugmatothripoides Bagnall
NEATRACTOTHRIPS **gen. n.**
PARACTINOTHRIPS **gen. n.**
SAUROTHRIPS Hood
ZACTINOTHRIPS Hood
ZEUGLOTHRIPS Hood
ZEUGMATOTHRIPS Priesner

Key to genera of Idolothripinae

1 Abdominal tergite I complete, transversely rectangular, bearing spiracles laterally and 4 pairs of setae sublaterally (Fig. 64) .... ***ALLIDOTHRIPS*** (p. 30)
– Abdominal tergite I reduced to a median pelta which is varied in shape but rarely transverse (cf. Fig. 63), rarely bearing setae (Figs 375–384); spiracles never associated with pelta 2

2 Tube long with numerous lateral setae (Fig. 24), also metathoracic sternopleural sutures present and anapleural sutures complete 3
– Not this combination of characters, if tube hairy then metathoracic sternopleural sutures absent and anapleural sutures short and incomplete 4

3 Head with stylets close together medially and 2 pairs of postocular setae (Fig. 5) [New Zealand] .... ***CLEISTOTHRIPS*** (p. 22)
– Head with stylets wide apart and V-shaped, dorsal surface with one pair of postocular setae and one pair of very stout ocellar setae (Fig. 133) [Fiji] .... ***CAMPULOTHRIPS*** (p. 42)

4 Tube usually long with numerous long lateral setae (these setae short in *Atractothrips*) (Fig. 374); anapleural sutures short and incomplete (Fig. 353); metathoracic sternopleural sutures absent 5
– Tube usually short, apparently glabrous or with lateral setae sparse and minute; anapleural sutures usually complete (Fig. 282); metathoracic sternopleural sutures present or absent 28

5 Praepectus absent [Neotropics; western Africa] 6
– Praepectus present, at least laterally, but often weakly sclerotised [eastern Oriental Region] 16

6 Median metanotal setae less than 25 μm long 7
– Median metanotal setae more than 40 μm long, usually very long [Central and South America] 8

7 Tube convex laterally, with numerous long (70 μm) setae [Africa] .... ***HYSTRICOTHRIPS*** (p. 84)
– Tube sides parallel to weakly concave, setae weak and scarcely 20 μm long [Florida] ***ATRACTOTHRIPS*** (part) (p. 82)

8 Abdominal segment I with lateral setae in normal position, arising on anterolateral sclerites, not associated with pelta 9
– Abdominal segment I with setae arising on lateral extremities of broad pelta (Figs. 376), or on small sclerites distinct from the anterolateral sclerites (Fig. 375) 12

9 Head with all dorsal setae shorter than distance between two ocelli; compound eyes small and angular (Fig. 346) .... ***ATRACTOTHRIPS*** (part) (p. 82)
– Head with at least one pair of elongate dorsal setae, compound eyes well developed and round (Fig. 340) 10

10 Head with 3 pairs of stout setae dorsally (Fig. 340); pronotal *am* setae more than 0·5 times as long as *aa* setae, *pa* setae reduced but *pm* setae large [Mexico] .... ***HYBRIDOTHRIPS*** (p. 84)
– Head with one pair of stout setae dorsally (Fig. 345); pronotal *am* setae reduced, *pm* setae never enlarged 11

11 Antennal segments III–IV with numerous small sense cones near apex ventrally; foretarsal tooth present in ♂ [Peru] .... ***ZACTINOTHRIPS*** (p. 87)
– Antennal segments III–IV without supernumerary ventral sense cones; foretarsal tooth present or absent in ♂ .... ***ACTINOTHRIPS*** (p. 81)

12 Head with maxillary stylets close together medially and retracted to postocular setae (Fig. 342) [Peru] .... ***ZEUGLOTHRIPS*** (p. 87)
– Maxillary stylets wide apart medially, not retracted so deeply into head 13

13 Abdominal tergites each with 2 pairs of wing-retaining setae (Fig. 368); tube more than 2·5 times as long as head [Brazil] .... ***SAUROTHRIPS*** (p. 86)
– Tergites each with only one pair of wing-retaining setae; tube at most 2·0 times as long as head 14

14 Micropterous, *or* forewing with no duplicated cilia.
♂ without a foretarsal tooth .... ***ZEUGMATOTHRIPS*** (p. 88)
– Macropterous, forewing with at least two duplicated cilia 15

15 Head with 2 pairs of stout setae dorsally (Fig. 339); antennal segments III–IV without stout dorsal setae [Brazil] .... ***CYPHOTHRIPS*** (p. 83)
– Head with 3 pairs of stout setae dorsally (Fig. 349); antennal segments III–IV with 2 stout dorsal setae (Fig. 357) [Trinidad] .... ***AZEUGMATOTHRIPS*** (p. 82)

16 Ventral length of eyes at least twice dorsal length, ventral prolongation of eyes broad (Fig. 341); head prolongation longer than eyes and bearing 2 pairs of setae [Malaya, Japan, Queensland] .... ***HOLUROTHRIPS*** (p. 83)
– Eyes not prolonged ventrally, or ventral prolongation shorter and narrower; head frequently little extended in front of eyes 17

17 Tergal wing-retaining setae leaf-like (Fig. 369); antennal segment III 0·9 times as long as IV [Malaya, Philippines] .... ***PARACTINOTHRIPS*** (p. 85)
– Tergal wing-retaining setae acute, usually sigmoid, antennal segment III longer than IV 18

18 Mesopraesternum transverse, apparently fused to lateral sclerites (Fig. 372); abdominal segment I with lateral setae arising anterior to lateral lobes of pelta (Fig. 377); forewing without duplicated cilia .... ***NEATRACTOTHRIPS*** (p. 85)
– Mesopraesternum boat-shaped, clearly defined from lateral sclerites; pelta different; forewings, when present, with duplicated cilia 19

19 Epimeral sutures complete; ♂ (where known) without drepanae laterally on abdomen 20
– Epimeral sutures incomplete; ♂ often with lateral drepanae on abdomen 22

20 Pronotum 2·0 times as broad as long; lateral lobes of pelta broad (Fig. 335) [South Africa] ***CYLINDROTHRIPS*** (p. 75)
– Pronotum more than 2·8 times as broad as long; lateral lobes of pelta slender 21

21 Head with 2 pairs of postocular setae arising in a transverse row; dorsal surface of head grossly swollen [New Caledonia] .... ***EGCHOCEPHALOTHRIPS*** (p. 76)

– Head with 2 pairs of postocular setae arising one behind the other (Fig. 322); dorsal surface of head less elevated [Australia] .... ***LASIOTHRIPS*** (p. 77)

22 Stylets well retracted and lying close together in middle of head (Figs 315, 318); ♂ with drepanae on tergite VI 23

– Stylets not well retracted, or if well retracted then not close together in middle of head (Figs 314, 321); ♂ with or without drepanae 24

23 Pronotum short (cf. *Lasiothrips*); pelta with slender lateral lobes; eyes sometimes slightly prolonged ventrally .... ***MEGALOTHRIPS*** (p. 77)

– Pronotum longer, only 1·5 times as broad as long; pelta with broad lateral lobes set close to centre (Fig. 330); eyes usually small, not prolonged ventrally [Europe]... ***BACILLOTHRIPS*** (p. 72)

24 Stylets retracted far into head (Figs 319, 321); tibiae pale or dark, not bicoloured; wings when fully developed, pale 25

– Stylets not retracted far into head (Figs 313–314); tibiae usually bicoloured; wings when fully developed with a darker median basal line 26

25 Tibiae completely dark; head and pronotal setae short except ocellars and epimerals; pelta with slender lateral lobes; abdominal tergites with 1 pair of sigmoid wing-retaining setae; ♂ without drepanae on abdomen [Florida] .... ***CEUTHOTHRIPS*** (p. 75)

– Tibiae completely pale; pelta with broad lateral lobes set close to centre; abdominal tergites with 1 to 2 pairs of sigmoid wing-retaining setae; ♂ without or with drepanae only on tergite VI [Holarctic] .... ***MEGATHRIPS*** (p. 78)

26 Lateral lobes of pelta narrowly joined to centre, broadest distal part of lobe sometimes 1·3, usually more than 2·0 times as long as the narrowest proximal part (Figs 332–333); metanotal setae 0·6 to 1·6 times as long as the distance between their bases; head 1·4 to 2·2 times as long as broad; ♂ drepanae, when present, not bearing a stout terminal seta [Old World Tropics, southern Europe and California] .... ***BACTROTHRIPS*** (p. 72)

– Lateral lobes of pelta broadly joined to centre, broadest distal part of lobe 1·1 to 1·4 times as long as the narrowest proximal part (Figs 334, 336); metanotal setae shorter or longer; ♂ drepanae, when present, bearing a stout terminal seta 27

27 Metanotal seta short, 0·3 times as long as the distance between their bases, abdominal tergites without accessory setae anterior to antecostal line; ♂ with posterior angles of at least abdominal tergite VIII produced outwards bearing a spine-like seta; head 1·4 to 2·2 times as long as broad [Australia] .... ***IDOLOTHRIPS*** (p. 76)

– Metanotal setae usually long, twice as long as the distance between their bases; abdominal tergites with accessory setae anterior to antecostal line; posterior angles of abdominal tergites of ♂ sometimes bearing a spine but not produced outwards; head 1·7 to 3·0 times as long as broad [Indomalaysia] .... ***MEIOTHRIPS*** (p. 79)

28 Abdominal tergites each with 2 (or 3) pairs of wing-retaining setae; usually macropterous, anterior pair of wing-retaining setae sometimes reduced in apterae but rarely absent (eg. *Elaphrothrips antennalis)* 29

– Abdominal tergites each with only one pair of wing-retaining setae; frequently apterous 37

29 Head grossly swollen and bearing numerous small setae, constricted to basal neck (Fig. 268); body ant-like [South Africa] .... ***HARTWIGIA*** (p. 68)

– Head and body different 30

30 Eyes prolonged posteriorly on ventral surface of head (Figs 264–267) ***OPHTHALMOTHRIPS*** (p. 70)

– Eyes scarcely longer ventrally than dorsally 31

31 Small dark brown species with complex sculpture on head (Figs 273, 274, 276) 32

– Large to very large, brown to black species, without complex sculpture on head 33

32 Antennal segment II with 1 or 2 large dorsal setae (Figs 291–292) [Java to Micronesia] ***MALESIATHRIPS*** (part) (p. 69)

– Antennal segment II without enlarged setae [Hawaii] .... ***DERMOTHRIPS*** (part) (p. 63)

33 Abdominal tergites with three or more pairs of major wing-retaining setae, anterior pair close to antecostal ridge (Fig. 297); ♂ usually with one or more tubercles on inner margin of forefemora .... ***MECYNOTHRIPS*** (p. 69)

– Abdominal tergites with two pairs of major wing-retaining setae (one pair only in *Elaphrothrips antennalis*), although large individuals may have several pairs of supplementary sigmoid setae anterolateral to the major pairs (Fig. 299); ♂ never with a tubercle on inner margin of forefemora 34

34 Foreocellus arising just posterior to major ocellar setae 35
– Foreocellus arising anterior to major ocellar setae 36

35 Head prolonged to front of eyes, prolongation about four times as long as wide (Fig. 269); pelta not divided into three separate parts .... ***TIAROTHRIPS*** (p. 71)
– Head scarcely prolonged in front of eyes; pelta divided into three distinct sclerites (Fig. 310) ***DINOTHRIPS*** (p. 64)

36 Pronotum of ♂ with anterior angles produced into flattened plates, forefemora without a sickle-shaped seta apically .... ***LAMILLOTHRIPS*** (p. 68)
– Pronotum of ♂ variable but never produced at anterior angles; ♂ forefemora often with a stout sickle-shaped seta .... ***ELAPHROTHRIPS*** (p. 64)

37 Anapleural sutures long but incomplete; metathoracic sternopleural sutures absent; head with 3 pairs of stout setae dorsally; metanotum and femora with long, stout setae; ♂ with a foretarsal tooth, also a stridulating mechanism between posterior angle of forefemora and ridged surface of forecoxae .... ***ANACTINOTHRIPS*** (p. 63)
– Not this combination of characters 38

38 Antennal segment IV with 3 sense cones 39
– Antennal segment IV with 2 or 4 to 5 sense cones 45

39 Maxillary stylets deeply retracted and close together medially in head (Fig. 2) [Holarctic] ***CRYPTOTHRIPS*** (p. 22)
– Maxillary stylets at least one-third of head width apart 40

40 Metathoracic sternopleural sutures absent .... ***BOLOTHRIPS*** (part) (p. 35)
– Metathoracic sternopleural sutures present 41

41 Yellow species; dorsal surface of head reticulate (Fig. 103) [New Zealand] ***ANAGLYPTOTHRIPS*** (p. 34)
– Usually brown species; head not reticulate 42

42 Pelta trilobed (Fig. 109) [India] .... ***LOYOLAIA*** (p. 38)
– Pelta triangular to broadly rounded 43

43 Compound eyes longer ventrally than dorsally (Fig. 94) .... ***BOLOTHRIPS*** (part) (p. 35)
– Compound eyes not prolonged ventrally 44

44 Eyes small, cheeks incut behind eyes; pelta broadly rounded (Fig. 104); tube with margins straight [North America] .... ***ILLINOTHRIPS*** (p. 38)
Eyes larger (Figs 120, 125); pelta usually triangular (Figs. 122–124, 129); tube frequently constricted at apex .... ***GASTROTHRIPS*** (p. 38)

45 Metathoracic sternopleural sutures not developed 46
– Metathoracic sternopleural sutures present but variable in length, width and position (Figs 20–22) 64

46 Antennal segment IV with 2 sense cones 47
– Antennal segment IV with 4 sense cones 48

47 Eyes prolonged ventrally on head; dorsal surface of head weakly sculptured ***BOLOTHRIPS*** (part) (p. 35)
– Eyes not longer ventrally than dorsally; dorsal surface of head strongly sculptured (Fig. 276) [Hawaii] .... ***DERMOTHRIPS*** (part) (p. 63)

48 Small species, dorsal surface of head with complex sculpture (Figs 67, 273) 49
– Small to very large species, head different 50

49 Yellow species with head reticulate (Fig. 67); antennal segment II without large setae [South Africa] .... ***FAUREOTHRIPS*** (p. 32)

– Brown species, head with complex sculpture (Figs 273–274); antennal segment II with 1 or 2 large setae .... ***MALESIATHRIPS*** (part) (p. 69)

50 Maxillary stylets retracted to compound eyes and close together medially in head (Figs 195–196); compound eyes large and round; antennal segment III shorter than IV......... *52*
– Maxillary stylets often wide apart and retracted only half-way into head, sometimes about one-third of head width apart and deeply retracted; a few species with stylets closer together have the eyes reduced and antennal segment III longer than IV 53

51 Antennal sense cones not exceptionally long (Fig. 243); pelta without any sculpture (Fig. 211) [Borneo] .... ***POLYTRICHOTHRIPS*** (p. 60)
– Sense cones on antennal segments III–IV long and slender, about half as long as each segment (Figs 251–253); pelta sculptured........ 52

52 Head elongate with one pair of long ocellar setae (Fig. 200) [India; Malaya] ***AESTHESIOTHRIPS*** (p. 51)
– Head not elongate, without long ocellar setae (Fig. 196) [Malaya] .... ***TARASSOTHRIPS*** (p. 61)

53 Pelta triangular with posterior margin concave, anterior margin of tergite II protruding into pelta (Fig. 212); antennal sense cones long (Fig. 242) [Malaya; Philippines] ***PELTARIOTHRIPS*** (p. 59)
– Not this combination of characters........ 54

54 Pelta D-shaped (Figs 225–227)........ 55
– Pelta broader (Fig. 215) 56

55 Antennal sense cones short (Fig. 245); preocellar setae long (Fig. 197) [South America] ***DIPLACOTHRIPS*** (p. 54)
– Antennal sense cones long (Figs 254–256); preocellar setae not elongate (Fig. 199) [Guyana; South East Asia] .... ***DICHAETOTHRIPS*** (p. 52)

56 Head about twice as long as wide; cheeks with several stout setae and an isolated ommatidium-like structure behind eyes; maxillary stylets retracted to postocular setae, one-third of head width apart (Fig. 201) [Malaya to Australia and Solomon Is.] .... ***CELIDOTHRIPS*** (p. 51)
– Head different, stylets further apart and usually lower in head, or with cheeks different........ 57

57 Small, usually apterous species with eyes usually prolonged ventrally; one pair of ocellar setae long (Figs 142–144); ♀ without fore tarsal tooth [Hawaii, Australia, New Zealand] ***NESOTHRIPS*** (part) (p. 47)
– Not above combination........ 58

58 Small, usually apterous species with eyes reduced to about 30 facets (50 in macropterae); cheeks narrowed behind eyes without stout setae; pelta broadly oval; ♀ without foretarsal tooth [Australia, New Zealand] .... ***CARIENTOTHRIPS*** (part) (p. 42)
– Not this combination, usually large dark species 59

59 Pronotum with a hook ventrally at each anterior angle (Fig. 206); forecoxae of ♂ with large recurved tubercle, forefemora of ♂ and ♀ with stout pale spines on inner surface [New Guinea] .... ***MACROTHRIPS*** (p. 59)
– Not as above 60

60 Fore tibiae with tubercle arising subapically in ♂ and ♀ (Fig. 220); foretarsal tooth well developed [India to Pacific]........ ***DIAPHOROTHRIPS*** (p. 52)
– Tubercle on foretibiae, if present, arising at inner apex, not subapically; ♂ sometimes without foretarsal tooth........ 61

61 Maxillary stylets scarcely retracted into head capsule (Fig. 188) [Australia] ..... ***HERATHRIPS*** (p. 58)
– Maxillary stylets retracted at least halfway into head 62

62 Preocellar setae well developed (Fig. 203); fore femora of ♀ (sometimes ♂) with row of stout dark tubercles (Figs. 217–219) [India to Micronesia] .... ***MACHATOTHRIPS*** (p. 58)
– Preocellar setae not elongate........ 63

63 Forefemora of ♀ with 7 to 10 tubercles on inner margin [India] .... ***ISCHYROTHRIPS*** (p. 58)
– Forefemora of ♀ without tubercles [Old World Tropics] .... ***ETHIROTHRIPS*** (p. 54)

64 Black apterous species with head strongly sculptured, broadly produced in front of compound eyes and constricted basally into a neck (Fig. 18); head and pronotum without long setae; mesopraesternum absent (Fig. 20) [Australia; New Zealand]........ ***EMPROSTHIOTHRIPS*** (p. 23)
– Not this combination of characters, if black and apterous then pronotal setae long and mesopraesternum developed 65

65 Maxillary palps with a large terminal sensorium which looks like a third segment (Fig. 77); small, yellow usually apterous species with 5 to 10 eye facets dorsally; antennae with 7 segments or less (8 segments in *Pseudocryptothrips*) 66
– Maxillary palps without a single large sensorium terminally; mostly dark species, with eyes larger and antennae usually 8-segmented 69

66 Antennae 8-segmented, segment IV with 4 sense cones (Fig. 73)... ***PSEUDOCRYPTOTHRIPS*** (p. 33)
– Antennae with 6 or 7 segments; IV with 2 sense cones 67

67 Antennal segment VII broadly joined or fused to VI (Figs 79–83)............. ***PRIESNERIELLA*** (p. 32)
– Antennal segment VII narrower at base than VI at apex 68

68 Antennal segment VII strongly constricted to basal neck (Fig. 78); mesonotum well developed with 1 to 3 pairs of major setae .... ***ALLOTHRIPS*** (p. 31)
– Antennal segment VII scarcely narrower at base than VI at apex; mesonotum fused to metanotum and with no setae [Hawaii] .... ***ALLOPISOTHRIPS*** (p. 31)

69 Maxillary stylets close together medially in head (Figs 2–11) 70
– Maxillary stylets at least one-third of head width apart 76

70 Antennal segment VIII clearly distinct from VII 71
– Antennae 7-segmented, or VII–VIII broadly joined 74

71 Dorsal surface of head strongly sculptured, bearing rows of short broad setae (Fig. 17) [Australia] .... ***PELINOTHRIPS*** (p. 27)
– Head without numerous short broad setae 72

72 Head elongate, dorsal surface elevated in midline, anterior margin bearing at least one pair of stout preocellar setae (Figs 7–11) [Australia] .... ***PHAULOTHRIPS*** (p. 27)
– Head different 73

73 Maxillary stylets almost touching and closely parallel medially in head (Figs 3–4); antennal segment IV with 2 sense cones (Fig. 53) [New Zealand] .... ***HEPTATHRIPS*** (part) (p. 23)
– Maxillary stylets close but not parallel and touching medially (Fig. 16); antennal segment IV with 4 sense cones [India; Australia] .... ***PRIESNERIANA*** (part) (p. 28)

74 Tube broad, basal or medial width more than 3 times apical width (Fig. 23)...... ***PYGOTHRIPS*** (p. 28)
– Tube more slender and parallel-sided, sometimes constricted at apex 75

75 Maxillary stylets not parallel and touching medially in head (Fig. 16) .. ***PRIESNERIANA*** (part) (p. 28)
– Maxillary stylets close together and parallel in head (Figs 3–4) [New Zealand, South Africa, Saudi Arabia] .... ***HEPTATHRIPS*** (part) (p. 23)

76 Apterous species; colour black, brown or yellow, usually constricted at metathorax with a pair of chalky white markings producing an ant-like appearance; metathoracic sternopleural sutures exceptionally long and extending to hind coxae (Fig. 100); antennal segment IV with 2 sense cones; eyes usually prolonged on ventral surface of head (Figs 84–86) .... ***COMPSOTHRIPS*** (p. 36)
– Wings present or absent; metathoracic sternopleural sutures shorter; antennal segment IV usually with 4 (or 5) sense cones; eyes rarely prolonged ventrally 77

77 Head with one pair of stout ocellar setae arising within ocellar triangle and anterior to posterior ocelli (Fig. 134) [India, Seychelles, Solomon Is.] .... ***NESIDIOTHRIPS*** (p. 47)
– Ocellar setae not arising in this position within ocellar triangle 78

78 Metanotum reticulate with several pairs of scattered minor setae; all major setae including postocellars, median metanotals and those on tergite IX with abruptly expanded apices; epimeral sutures not complete [Africa] .... ***ELGONIMA*** (p. 45)
– Not this combination of characters 79

79 Head with one pair of preocellar setae more or less conspicuous (Figs 130, 140); species often large but pronotum usually broad and flat, scarcely thickened medially with am, aa and ml setae much shorter than epim and pa setae; ♂ with forefemora enlarged, posterior angle flattened and extending to a stridulatory file on forecoxae (Fig. 149) 80

– Preocellar setae not larger than ocellars or postocellars; pronotum usually thickened medially in large species; pronotal anterior setae usually not much shorter than posterior pairs; male forefemora and forecoxae not developed into a plectrum and stridulatory file 81

80 Foretibiae of male produced into long tubercle which underlies the long, slender foretarsal tooth (Fig. 147); forefemora not bearing stout spines on inner margin; pterothoracic anapleural ridge sinuate and ending in a small lateral tubercle; metathorac sternopleural sutures short (Fig. 150) [south-eastern U.S.A.] .... ***SPOROTHRIPS*** (p. 50)

– Foretibiae of ♂ without apical tubercle; forefemora usually swollen and inner margin bearing several stout spines; anapleural ridge not extending to a lateral tubercle; metathoracic sternopleural sutures long [Florida and Texas to Brazil] .... ***DICERATOTHRIPS*** (p. 43)

81 Antennae 7-segmented or with segments VII–VIII broadly joined 82

– Antennae 8-segmented 83

82 Tube greatly expanded, lateral margins convex (Fig. 161) [widespread in tropics] ***ACALLUROTHRIPS*** (p. 40)

– Tube normal and tapering with margins straight [New Zealand] .... ***OZOTHRIPS*** (p. 24)

83 Head with one ommatidium-like structure on each cheek, situated midway between hind margin of eye and posterior of head (Fig. 141); tube exceptionally broad with convex margins, maximum width 5·0 times apical width (Fig. 158); forewing without duplicated cilia [Brazil] .... ***PHACOTHRIPS*** (p. 49)

– Cheeks without ommatidium-like structure; tube not so broad; forewing usually with duplicated cilia 84

84 Tube heavy with margins convex and sometimes bearing one or more lateral setal bases (Figs 153–156) [widespread in tropics] .... ***NEOSMERINTHOTHRIPS*** (p. 45)

– Tube with margins straight and tapering 85

85 Foretarsus of ♀ with well-developed tooth; tube long and slender [Afrotropical Region] ***PSEUDOEURHYNCHOTHRIPS*** (p. 50)

– Foretarsus of ♀ without a tooth (very small tooth present in *N. doulli*; moderate tooth present in *N. leveri* but this has tube short) [Pacific & Oriental Regions] 86

86 Maxillary stylets usually deeply retracted, extending to postocular setae, usually subparallel medially and about one-third of head width apart (Figs 135–137), if V-shaped then head more than 1–3 times as long as wide.................................. ***CARIENTOTHRIPS*** (part) (p. 42)

– Maxillary stylets wide apart and V-shaped in head, head less than 1·2 times as long as wide (Figs 142–144) .... ***NESOTHRIPS*** (part) (p. 47)

Tribe **PYGOTHRIPINI**

As discussed above this tribe corresponds largely to the Cryptothripini of previous authors, with some minor additions (Tables 2 & 3). The name change is due to recognition of the close relationship between *Cryptothrips* and *Pygothrips* species, and the priority of the family-group name Pygothripidae (Hood, 1915) over Cryptothripinae (Karny, 1921*a*) (Table 1). The most important character defining the group is the presence of only a single pair of wing-retaining setae on each tergite (except for two species of *Phaulothrips*). The metathoracic anapleural sutures are always complete, but the sternopleural sutures may be well developed or absent. The tube is variable in structure between genera, but in only two species does it bear prominent lateral setae.

Six sub-tribes are here recognised within the Pygothripini (Table 3) and this group at present includes 45 genera and 331 species. The sub-tribe Pygothripina includes species with the largest number of presumably plesiomorphic characters. Sister-group relationships between the sub-tribes are unclear, but the Macrothripina may be the sister-group of the Idolothripini, and the

Allothripina the sister-group of the Pygothripina. The Gastrothripina and Compsothripina may be sister-groups on the basis of the frequent presence of three sense cones on antennal segment IV; on this assumption they would presumably have been derived from *Cryptothrips*-like ancestors (Fig. 1). The Diceratothripina differ from the Pygothripina primarily in having the maxillary stylets farther apart and lower in the head.

Genera of Pygothripina

This group name was proposed by Hood (1915) as Pygothripidae to include one monobasic genus from Australia characterised by its greatly swollen tube. Hood and subsequent authors have emphasised for systematic purposes the importance of a swollen tube, but this characteristic has developed in at least two distinct phyletic lines of Idolothripinae (*Acallurothrips, Diceratothrips, Neosmerinthothrips* and *Phacothrips* in Diceratothripina; *Phaulothrips* and *Pygothrips* in Pygothripina) as well as in the phlaeothripine tribe Docessissophothripini (*Holothrips* and *Symphyothrips*) (p. 96).

The species of *Pygothrips* have many characters in common with the species of *Cryptothrips*, and as they are here both placed in the same subtribe the name Pygothripidae must take priority over Cryptothripinae (see Table 1). Most of the genera placed in this group (as Cryptothripina) by Priesner (1961) are now referred to the Phlaeothripinae tribe Docessissophothripini (p. 90).

The Pygothripina is used here for a group of 9 genera. Most of these come from New Zealand and Australia, although *Pygothrips* has several Neotropical species and *Cryptothrips* is Holarctic in distribution. The members of these genera all have two undoubtedly plesiomorphic characters, the presence of metathoracic sternopleural sutures and complete anapleural sutures. Moreover, many members of the group, alone amongst idolothripines, have well-developed maxillary guides. Finally the pelta is broad basally in many species. These characteristics, together with the zoogeographic distribution, suggest that Pygothripina species are the closest living representatives to the proto-Idolothripinae.

The New Zealand idolothripine fauna might be expected to be particularly significant when considering the origins of the Idolothripinae, because ancestral groups of Thripidae have recently been described from that area (Mound & Palmer, 1981; Mound & Walker, 1982). In New Zealand there are two groups of idolothripines; a few species of Diceratothripina evidently derived from Pacific and Australian faunas, and the *Heptathrips* genus-group (*Cleistothrips, Heptathrips* and *Ozothrips*). This latter genus-group is particularly interesting because, not only do the members retain the plesiomorphic characters of other Pygothripina but the species show a wide range of structural diversity. This suggests that the group is relatively ancient.

The diversity within the *Heptathrips*-group is remarkable. Most of the species have the antennae 7-segmented (Figs 52–53), but one (?two) species of *Ozothrips* and two species of *Heptathrips* from New Zealand (also two South African species transferred to *Heptathrips* from *Ascania*, and one Saudi Arabian species transferred to *Heptathrips* from *Capnothrips*) have the eighth segment more or less developed (Figs 50–51). Most of the species have only two sense cones on segments III and IV, but two species of *Ozothrips* have four sense cones on IV. Again, most of the species have long maxillary stylets deeply retracted and touching medially (Figs 2–5), but the stylets are further apart in *Ozothrips* species (Figs 12–14). Finally, most of the species lack praepectal plates although these are weakly developed in two species of *Ozothrips*. It thus seems logical (although very surprising) to deduce that the 'proto-idolothripine' condition involved 7-segmented antennae with two sense cones on III and IV, elongate stylets with stout maxillary guides and absence of praepectal plates.

A further unusual feature of the *Heptathrips* group is the diversity in form of the tube. In *Cleistothrips* the tube is long and hairy (Fig. 24), a condition found otherwise only in the two most advanced idolothripine groups – Idolothripina and Hystricothripina. The tube is variable in *Heptathrips* species from long to very short. One (undescribed) species of *Heptathrips* is remarkable for its reticulate sculpture similar to *Faureothrips*, and *Ozothrips janus* is equally unusual because of the ventral prolongation of the compound eyes (Fig. 12). One species of *Ozothrips*, described below as *eurytis*, would probably be placed in the Diceratothripina near

Neosmerinthothrips if it were not for the fact that it is known only from native forest habitats in New Zealand and fits logically into the pattern of diversity of the *Heptathrips*-group.

Of the remaining six pygothripine genera *Phaulothrips* species have elongate stylets as in *Pygothrips,* also the head bears a pair of stout ocellar setae as in some species of *Pygothrips* and *Cryptothrips*. The Australian genus *Pelinothrips* probably shared a common ancestor with *Phaulothrips*, and the remarkable Australian genus *Emprosthiothrips* is here interpreted as an extreme form on this phyletic line. Finally *Priesneriana* appears to be related to *Cryptothrips* but has the stylets further apart and the compound eyes reduced (Fig. 16). *Cryptothrips* species are the only members of Pygothripina with three sense cones on the fourth antennal segment (except possibly *Priesneriana amneius* in which this is possibly variable).

CLEISTOTHRIPS Bagnall

(Figs 5, 24, 32, 46)

Cleistothrips Bagnall, 1932: 511. Type-species: *Cleistothrips idolothripoides* Bagnall, by monotypy.

This genus comprises a single large species from New Zealand which bears a long, hairy tube similar to that found in members of the distantly related group Idolothripini (Fig. 24). Despite this tube, and the presence of two pairs of postocular setae (Fig. 5), *idolothripoides* is very similar to species of *Heptathrips*. The median area of the pelta is smaller than in *Heptathrips* or *Ozothrips*, and the lateral wings of the pelta more elongate (Fig. 32). *Cleistothrips* forms with these two genera the *Heptathrips* genus-group which is the essential idolothripine element of the New Zealand fauna. Contrary to Mound (1968), it is not related to the Docessissophothripini, because the tergites bear a single pair of wing-retaining setae, the pelta is wide basally, the maxillary stylets are broad, and antennal segments III and IV each bear only two sense cones (Fig. 46).

SPECIES INCLUDED
idolothripoides Bagnall, 1932: 512–3. Holotype ♀, NEW ZEALAND (BMNH).

CRYPTOTHRIPS Uzel

(Figs 2, 34, 47)

Cryptothrips Uzel, 1895: 228–9. Type-species: *Cryptothrips lata* Uzel (a synonym of *nigripes* Reuter), by subsequent designation, Hood, 1916: 64.

Jacot-Guillarmod (1978) lists 24 species under *Cryptothrips*. However, *breviventris* Hood (1927*a*) is a phlaeothripine and should be placed provisionally in *Hoplothrips* (teste Steve Nakahara *in litt.*); *okamatoi* Karny (1913*c*) is a *Phlaeothrips* species with long postocular setae; *daedalus* Karny (1912*b*) apparently represents a *Psalidothrips* species with postocular setae arising far behind the eyes. (Type-material of the latter two species has been studied on loan from the Humboldt University Museum, Berlin.) Moreover, the following seven species also belong in the Phlaeothripinae but in undetermined genera: *additamentus* Karny, *bursarius* Karny, *longicaput* Girault, *nigronympha* Girault, *pusillus* Karny, *rufiprothorax* Girault, *schilleri* Girault.

Two species described in *Cryptothrips* from Australia, *pygus* and *shavianus,* are here transferred to *Pygothrips*; three further Australian species, *amneius, laticeps* and *uptoni*, are transferred to *Priesneriana*; *constans* is now regarded as a synonym of *Nesothrips niger,* and *latus* var. *fijiensis* is a synonym of *Ethirothrips hibisci.* Judging from the original description, *sauteri* may belong in *Pygothrips*, but the description of *flavus* is too inadequate for recognition. Finally, *maritimus* was described as a predator of Scolytid beetle larvae, and judging from the original illustration may well belong in *Liothrips*.

Cryptothrips thus appears to be Holarctic in distribution, and it may be the sister-group of the Indo-Australian genus *Priesneriana.* The latter has reduced eyes which are directed forwards (Fig. 16), and four sense cones on the fourth antennal segment (Fig. 48). In contrast *Cryp-*

tothrips species have three sense cones on the fourth segment (Fig. 47). Both genera are similar to *Pygothrips* in having broad maxillary stylets deeply retracted and close together in the middle of the head (Figs 2, 6), and the metathoracic sternopleural sutures are well developed.

SPECIES INCLUDED
* ***angustus*** Uzel, 1895: 231–2. Holotype ♀, CZECHOSLOVAKIA: Bohemia (? lost).
carbonarius Hood, 1908*a*: 376–7. Holotype ♂, U.S.A.: Illinois (USNM).
longiceps Hood, 1912*c*: 153–4. Holotype ♀, U.S.A.: Illinois (USNM).
* ***flavus*** Solowiow, 1924: 24. Types not indicated, U.S.S.R. (? lost).
* ***maritimus*** Djadetschko, 1962: 764–5. Holotype ♀, U.S.S.R.: Ukraine (not known).
nigripes (Reuter, 1880: 11) (*Phloeothrips*). Holotype ? ♀, FINLAND (? lost).
lata Uzel, 1895: 230–1. Syntypes ♂♀, CZECHOSLOVAKIA: Bohemia (? lost).
major Bagnall, 1911: 60–1. Holotype ♀, NORWAY (BMNH).
latus f. *breviceps* Maltbaek, 1929: 372. Types not designated, DENMARK (? lost).
williamsi Bagnall, 1933*a*: 120–1. Holotype ♂, GREAT BRITAIN: England (BMNH).
nigripes phariacus Titschack, 1965: 147, replacement name for *insularis* Titschack, 1964: 51. Syntypes ♂♀, YUGOSLAVIA (SMF).
rectangularis Hood, 1908*b*: 307–9. Lectotype ♀, U.S.A.: Illinois (USNM).
salicis (Watson, 1921: 80–1) (*Trichothrips*). Syntypes ♂♀, U.S.A.: New York (FSAC).
* ***sauteri*** Karny, 1913*c*: 1278. Holotype? ♀, TAIWAN (unknown).
* ***sordidatus*** Hood, 1927*b*: 199. Lectotype ♀, U.S.A.: California (USNM).

EMPROSTHIOTHRIPS Moulton

(Figs 18, 19, 20, 31, 55)

Emprosthiothrips Moulton, 1942*a*: 12. Type-species: *Emprosthiothrips niger* Moulton, by monotypy.

This genus comprises six dark, apterous species from Australia which are remarkable for the shape of their antennae (Fig. 55), and for their reduced setae and fused sclerites. As a result of these peculiarities the systematic position of the genus has been in doubt. Priesner (1961) placed it in a monobasic tribe, but Mound (1974*a*) suggested a relationship to *Dermothrips* and *Pelinothrips* 'in the Cryptothripini'. *Dermothrips* is here referred to the Elaphrothripina, but *Pelinothrips* and *Emprosthiothrips* probably represent together an Australian derivative from early Pygothripina ancestors. The stylets are further apart than in other Pygothripina species (in *brimblecombei* they are very short and wide apart), but the praepectal plates and metathoracic sternopleural sutures are well developed, antennal segment IV bears two sense cones, and segments VII–VIII are broadly joined. The species of this genus are found at the bases of grass tussocks; four of them have the eyes prolonged ventrally as in some species of *Bolothrips* and *Carientothrips* in the same habitat.

SPECIES INCLUDED
bogong Mound, 1969: 185. Holotype ♀, AUSTRALIA (ANIC).
brimblecombei Mound, 1974*a*: 51–2. Holotype ♀, AUSTRALIA (ANIC).
brittoni Mound, 1969: 186. Holotype ♂, AUSTRALIA (ANIC).
csiro Mound, 1969: 185–6. Holotype ♀, AUSTRALIA (ANIC).
epallelus Mound, 1974*a*: 52–3. Holotype ♂, AUSTRALIA (ANIC).
niger Moulton, 1942*a*: 12–3. Holotype ♀, AUSTRALIA (CAS).

HEPTATHRIPS Moulton

(Figs 3, 4, 33, 53)

Heptathrips Moulton, 1942*a*: 3. Type-species: *Heptathrips tonnoiri* Moulton, by monotypy.
Ascania Faure, 1954*a*: 17–20. Type-species: *Ascania magnifica* Faure, by original designation. **Syn. n.**
Capnothrips Zur Strassen, 1979: 99. Type-species: *Capnothrips ruficaudis* Zur Strassen, by monotypy. **Syn. n.**

Only one species was originally described in this genus, but a further four undescribed species from New Zealand have been studied; these will be treated in detail in an account of the

Phlaeothripidae of New Zealand currently in preparation. One species is similar to *tonnoiri* but with a longer tube. The other three are apterous; one is pale and strongly reticulate, one has a short tube and antennal segment VIII defined by a suture, the third has a stout tube and segment VIII clearly separated from VII. As discussed above, this remarkable structural radiation suggests the group has been long established in New Zealand. The species all have the stylets close together in the head with well-developed maxillary guides (Figs 3, 4), a broadly based pelta (Fig. 33) and well-developed metathoracic sternopleural sutures.

The two species from South Africa described in *Ascania* cannot at present be distinguished from *Heptathrips*. The heavy tube with constricted apex found in *magnifica* is longer but otherwise similar to that of one of the undescribed New Zealand species referred to above. These African species have the preocellar setae stouter, the metathoracic sternopleural sutures weaker, and the tergal wing-retaining setae straighter than the New Zealand species. The single species described in *Capnothrips* is very similar to *africana* but has the inner sense cone on antennal segment III much shorter, scarcely one-third as long as the outer sense cone.

SPECIES INCLUDED

africana (Moulton, 1949: 491–2) (*Adelothrips*). Holotype ♀, SOUTH Africa (BMNH). **Comb. n.**
magnifica (Faure, 1954*a*: 20–3) (*Ascania*). Holotype ♀, SOUTH AFRICA (NCIP). **Comb. n.**
ruficaudis (Zur Strassen, 1979: 99–101) (*Capnothrips*). Holotype ♀, SAUDI ARABIA (NMB). **Comb. n.**
tonnoiri Moulton, 1942*a*: 3–4. Holotype ♀, NEW ZEALAND (CAS).

OZOTHRIPS gen. n.

Type-species: *Ozothrips priscus* sp. n.

Small to large, brown species of Pygothripini. Antennae 7-segmented or with VII-VIII closely joined; III with two sense cones, IV with two or four sense cones. Head usually slightly longer than wide, eyes large; maxillary stylets broad, retracted almost to postocular setae and about one-third of head width apart, maxillary guides stout; mouth cone broadly rounded, maxillary palps stout. Pronotum transverse, relatively longer in large ♂ with median thickening, epimeral sutures complete; praepectus present or absent; probasisternum large, mesopraesternum broadly boat-shaped, *or* both sclerites eroded. Foretarsi with a large tooth in ♂, with or without a small tooth in ♀. Forewing broad, almost parallel-sided, with duplicated cilia. Metathoracic sternopleural sutures well developed, anapleural sutures complete. Pelta with broad lateral wings; tergite II eroded laterally; tergites II–VII each with one pair of weakly sigmoid wing-retaining setae; tergite IX with three pairs of slender setae in both sexes; sternites with one row of small discal setae, reticulate sculpture more evident in ♂ than in ♀.

The type-species of this new genus is abundant and widespread on dead leafy twigs of *Nothofagus* in New Zealand. The fact that it is found only in native forest areas is good evidence that it is itself endemic to that country. Most of the characters listed above are shared with *Heptathrips* and *Cleistothrips*, although the widely separated stylets of *Ozothrips* are regarded as an apomorphy achieved independently of the similar stylet arrangement found in many other less closely related idolothripines. Two of the species described below have four sense cones on antennal segment IV, they lack a foretarsal tooth in the female, and praepectal plates are developed. These species are thus convergent in structure on members of the widespread tropical genus *Neosmerinthothrips*, but with the tube slender and antennal segments VII–VIII broadly joined or fused. In the absence of evidence to the contrary, it seems sensible to regard them as endemic but aberrant members of the New Zealand fauna.

Key to *Ozothrips* species

1 Antennal segment IV with 2 sense cones (Fig. 51); praepectus absent; ♀ with well-developed foretarsal tooth; macropterous .... ***priscus*** sp. n. (p. 26)
– Antennal segment IV with 4 sense cones (Figs 50, 52); praepectus present; ♀ with no foretarsal tooth; usually apterous 2

2 Antennal segments VII–VIII forming one unit but with suture complete (Fig. 50); eyes narrowed but not elongate ventrally (Fig. 13); tergite IX setae B_1 about half as long as tube .... ***eurytis*** sp. n. (p. 25)

– Antennal segments VII–VIII without a suture (Fig. 52); eyes narrowed and prolonged ventrally (Fig. 12); tergite IX setae longer than tube .... ***janus*** sp. n. (p. 26)

Ozothrips eurytis sp. n.

(Figs 13, 42, 50)

Macropterous ♀. Colour mainly brown, inner apex of femora yellowish, also base and external margin of antennal III; forewings uniformly shaded; setae dark.

Head with postocular setae arising close to eyes, ocelli far apart, postocellar setae small, eyes not large (Fig. 13). Distal antennal segments with clearly defined pedicels, VII–VIII broadly fused but with suture usually complete, III with 2 sense cones, IV with 4 sense cones (Fig. 50). Pronotum transverse, epimeral sutures complete; praepectal and probasisternal plates weakly sclerotised, mesopraesternum and mesoeusternum broadly eroded medially. Mesonotal midlateral setae minute; metanotal median setae close together, sternopleural sutures short and broad. Forewing parallel-sided, 5 to 8 duplicated cilia. Pelta broad basally but weakly and irregularly sclerotised (Fig. 42). Tergite IX setae acute. Tube very slightly constricted apically and in basal third. Sternites with 3 to 9 discal setae.

Measurements (holotype ♀ in μm). Body length 1850. Head, length 200; width 190; postocular setae 70; postocellar setae 20. Pronotum, length 120; width 240; major setae – am 20, aa ?, ml 30, epim 75, pa 60. Forewing, length 650; median width 65; sub-basal setae 25. Tergite IX setae 70, 75, 120. Tube, length 150; terminal setae 130. Antennal segments III–VII+VIII length 65, 62, 58, 55, 55.

Micropterous ♀. Body brown, head and tube darkest; leg colour similar to macropterae but distal half of femora sometimes yellow; antennal segments I–III sometimes paler but more or less shaded particularly at apices.

Head with ocelli reduced or absent, postocellar setae slightly longer than in macropterae. Mesonotum with small round lobes laterally but axillary sclerites absent. Praepectus small; pterothoracic sternites eroded; pelta variable but broad basally; tergal wing-retaining setae absent.

Measurements (paratype ♀ collected with holotype in μm). Body length 2200. Head length 230; width 205; postocular setae 80; postocellar setae 30. Pronotum, length 160; width 270; major setae – am 27, aa ?, ml 45, epim 90, pa 50. Tergite IX setae 90, 85, 120. Tube length 170. Antennal segments III–VII+VIII length 75, 70, 63, 57, 73.

Apterous ♂. Similar to ♀ but pronotum and forefemora enlarged; foretarsal tooth as long as tarsal width in large individuals; tube slightly constricted medially; sternites IV–VI reticulate anterior to discal setae (except gynaecoid ♂). Measurements (paratype ♂ collected with holotype in μm). Body length 1700. Head, length 195; width 170; postocular setae 90; postocellar setae 35. Pronotum, length 170; width 240; major setae – am 30, aa 55, ml 90, epim 120, pa 90. Tergite IX setae 75, 65, 80. Tube length 130. Antennal segments III–VII+VIII 60, 60, 57, 50, 60.

Specimens studied

Holotype ♀ macroptera, **New Zealand**: North Island, Wattle Bay near Auckland, on dead twigs and branches, 23.ii.1979 (*L. A. Mound* 1349) (NZAC).

Paratypes (2 ♀ mac., 19 ♀ mic., 7 ♂ apt.). **New Zealand.** North island: 5 ♀, 2 ♂ collected with holotype; Auckland, Mt Albert, 1 ♀, 18.xi.1978, 1 ♀ mac., 16.xii.1978 (*A. K. Walker*); Te Aroha, 1 ♀ mac. 6 ♀, 2 ♂ on dead twigs and branches, 14.ii.1979 (*L. A. Mound* 1447, 1452); Coromandel Peninsula, Coroglen Saddle, 2 ♀, 1 ♂ on dead branch, 13.ii.1979 (*L. A. Mound* 1443). South Island: Nelson, 1 ♀ from Thrush nest, 6.xii.1967 (*B. S. Gourley*); 2 ml north of Reefton, 1 ♂, 6.ii.1979 (*L. A. Mound* 1411); Glenorchy State Forest, Dart River, 1 ♀, 1 ♂, 21.i.1981 (*Valentine & Noyes*); Invercargill, 1 ♀ on Rhododendron, 18.iv.1977 (*A. K. Walker*). Chatham Islands: South East Island, 1 ♀, 9.xi.1970 (*J. Townsend*); Chatham, Waitangi, 1 ♀, 10.ii.1967 (*G. W. Ramsey*) (NZAC & BMNH).

Material excluded from paratype series. **New Zealand**. South Island: Kaihoka Lake, 10 ml west of Collingwood, 1 ♀ mac., 5 ♀ mic., 5 ♂ apt. on dead frond of *Rhopalostylis sapidia*, 1.ii.1979 (*L. A. Mound* 1392).

Comments. The series of specimens collected on a dead palm frond at Kaihoka Lake is remarkable in that the micropterae and apterae, but not the macropterae, have antennal segments II–III almost clear yellow, and the legs more extensively pale than typical specimens of *eurytis*. In addition, six specimens have been studied from three widely separated areas of the North Island of New Zealand (Auckland, Rotorua, Levin) with the tube clear yellow medially. These six specimens probably represent a further new species. *O. eurytis* is widespread in New Zealand, but has only been taken in native forest areas. This reinforces the impression that the

species is related to the larger and more common species, *priscus*, described below, and that they, together with *janus*, constitute an endemic New Zealand genus. Both *eurytis* and *janus* (together with the species with the tube yellow referred to above) have praepectal plates unlike *priscus*, the type-species of this genus. One apterous female of *eurytis* collected with the holotype bore about 10 specimens of a mite species belonging to the genus *Adactylidium* (Pyemotidae).

Ozothrips janus sp. n.

(Figs 12, 40, 52)

Apterous ♀. Colour brown, foretarsi yellow, extreme apex of forefemora and median area of foretibiae yellowish, also extreme base of antennal segment III and apex of II; tube golden yellow with dark brown apex; major setae weakly shaded with long fine apices.

Head about as wide as long, ocelli absent, ocellar setae elongate; eyes greatly prolonged ventrally with two rows of large ommatidia (Fig. 12); maxillary stylets apparently wide apart, V- or U-shaped (Disorganised in available specimens). Antennae with segments pedicillate; 2 sense cones on III, 4 on IV, VIII completely fused to VII (Fig. 52). Foretarsus with inner margin slightly thickened. Praepectus weak; pterothoracic sternites heavily eroded; meso- and metanota small and transverse. Pelta broad and flattened (Fig. 40); lateral abdominal setae elongate; wing-retaining setae short and straight; tube short and constricted apically. Sternites with few discal setae, holotype with no discal setae on II–III.

Measurements (holotype ♀ in μm). Body length 1500. Head, length 150; width 170; postocular setae 120; postocellar setae 60. Pronotum, length 120; width 240; major setae – am 20, aa 55, ml 105, epim 150, pa 120. Tergite IX setae 135, 135, 120. Tube, length 110; terminal setae 120. Antennal segments III–VII length 40, 45, 43, 43, 55.

Specimens studied

Holotype ♀, **New Zealand**: North Island, Hauraki Gulf, Noises Islands, Otata I., in seed heads of *Ghania*, 1.xii.1979 (*A. K. Walker*) (NZAC).

Paratype. 1 ♀ collected with holotype (BMNH).

Comments. The remarkable ventral prolongation of the eyes in this species suggests that its normal habitat is at the base of grasses. Despite this character, *janus* is very similar to *eurytis*, although more apteriform.

Ozothrips priscus sp. n.

(Figs 14, 41, 51)

Macropterous ♀. Dark brown, tarsi slightly paler; pedicels of antennal segments III–V yellow to light brown; major setae brown, terminal setae of tube darkest; forewings strongly shaded.

Head with eyes slightly smaller ventrally than dorsally, postocular setae finely acute (Fig. 14); maxillary stylets broad (10–12 μm). Antennae with 7 segments, VI broadly truncate at apex, pedicels of VI–VII narrow, III–IV each with 2 long sense cones (Fig. 51). Praepectus absent, probasisternum large, mesopraesternum broadly boat-shaped. Forefemora slender; foretarsal tooth small and curved at inner apical margin. Mesonotal midlateral and metanotal median setae moderately developed (50 mm). Forewing with 4 sub-basal setae. Pelta broadly rounded medially (Fig. 41). Tergite II posteroangular setae not developed (Fig. 41).

Measurements (holotype ♀ with smallest paratype ♀ in μm). Body length 3700 (3100). Head, length 390 (345); median width 300 (280); postocular setae 120 (96). Pronotum, length 210 (160); median width 420 (370); major setae – am 40 (40), aa 43 (40), ml 75 (60). epim 120 (120), pa 75 (66). Forewing, length 1500 (1300); distal width 150 (120); sub-basal setae 22, 65, 105, 210 (?, 60, 105, 200); number of duplicated cilia 35 (28). Tergite IX setae 240, 330, 300 (210, 300, 300). Tube, length 400 (320); longest terminal setae 210 (200). Antennal segments III–VII length 130, 110, 100, 85, 105 (110, 90, 90, 75, 85).

Macropterous ♂. Colour and structure very similar to ♀; large males with a small tubercle ventrally on frons (approximately underlying posterior ocelli), also with pronotal midlateral setae elongate, forefemora enlarged, foretarsal tooth broad and about as long as tarsal width, and antennal segment III relatively long. Measurements (large and small paratype ♂ – LAM 1372; LAM 1407 – in μm). Body length 3400 (2800). Head, length 390 (345); median width 260 (240); postocular setae 165 (120). Pronotum, length 315 (180); median width 440 (345); major setae – am 40 (25), aa 75 (30), ml 170 (60), epim 120 (130), pa 110 (60).

Forewing, length 1550 (1300). Tergite IX setae 270, 320, 300 (200, 270, 255). Tube length 380 (300). Antennal segments III–VII lengths 145, 120, 105, 85, 90 (115, 90, 90, 80, 90).

Specimens studied

Holotype ♀, **New Zealand**: South Island, Whangamoa Saddle near Nelson, on dead leaves and branches of *Nothofagus*, 27.i.1979 (*L. A. Mound* 1359) (NZAC).

Paratypes (93 ♀ 40 ♂): **New Zealand**. South Island: 10 ♀, 5 ♂ data as for holotype, 7 ♀ similar data except LAM 1357; Nelson, 17 ♀, 6 ♂ on dead twigs and leaves, 28.i.1979 (LAM 1367); Nelson, Dun Mt., 4 ♀, 4 ♂, 29.i.1979 (LAM 1372); Nelson, Cobb Reservoir, 4 ♀, 1 ♂, 31.i.1979 (LAM 1381); Nelson, Lake Rotoiti, 24 ♀, 14 ♂, 4–8.ii.1979 (*L. A. Mound & A. K. Walker*); Marlborough Sounds, Tennyson Inlet & Opouri Saddle, 16 ♀, 8♂ on dead leafy branches, 28.i.1979 (*A. K. Walker* 3, 6); 20 ml NE. of Reefton, 2 ♀ on dead *Nothofagus* branches, 6.ii.1979 (LAM 1716). North Island: 20 ml S. of Turangi, 7 ♀, 2 ♂ on dead *Nothofagus* branches, 19.ii.1979 (LAM 1478) (NZAC & BMNH).

Comments. Both *priscus* and *eurytis* are variable in body size with several characters subject to allometric growth particularly in males. *O. priscus* has been collected only on dead *Nothofagus* branches and twigs which presumably support a particular fungus to which the thrips is specific.

PELINOTHRIPS Mound

(Figs 17, 38, 39, 54)

Pelinothrips Mound, 1974*a*: 75–6. Type-species: *Rhopalothrips ornatus* Girault, by original designation.

Two species, both Australian, are placed in this genus. These resemble *Cryptothrips* species in having long maxillary stylets deeply retracted into the head with maxillary guides weakly indicated medially. The metathoracic sternopleural sutures are short, the tergites each bear a single pair of wing-retaining setae, and praepectal plates are present. However, antennal segment IV only bears two sense cones (Fig. 54), and both sexes have a foretarsal tooth. This genus is probably related to the Australian genus *Emprosthiothrips* in which the species have the maxillary stylets slightly further apart.

Species included

brochotus Mound, 1974*a*: 76–7. Holotype ♀, Australia (ANIC).
ornatus (Girault, 1930: 1) (*Rhopalothrips*). Holotype ♀, Australia (QMB).

PHAULOTHRIPS Hood

(Figs 7–11, 25–30, 43–45)

Phaulothrips Hood, 1918*b*: 146–7. Type-species: *Phaulothrips vuilleti* Hood, by monotypy.
Titanothrips Karny, 1920*c*: 44. Type-species: *Titanothrips portentosus* Karny, by monotypy. [Synonymised by Mound, 1974*a*: 78.]
Tetraceratothrips Bagnall, 1924: 628. Type-species: *Tetraceratothrips agrestis* Bagnall, by monotypy. [Synonymised by Mound, 1974*a*: 78.]
Kaleidothrips Kelly, *in* Kelly & Maine, 1934: 73. Type-species: *Kaleidothrips inquilinus* Kelly, by monotypy. **Syn. n.**

A revision of this genus by Mound (1974*a*) included nine species, all of which are Australian although specimens of *vuilleti* have now been studied from Tanzania. In addition, the single species in *Kaleidothrips* is here interpreted as an aberrant member of *Phaulothrips*, undescribed species from New Guinea and Fiji are referred to by Mound (1974*a*: 81) and *Docessissophothrips magnificus* Bianchi from Samoa is also here placed in *Phaulothrips*. This latter species has the pelta typical of the genus (Fig. 28), a pair of slender preocellar setae, and only one pair of wing-retaining setae on each tergite. However, the pair of postocular setae found on the cheeks of the other *Phaulothrips* species arise dorsally behind the dorsal postocular setae in *magnificus* (Fig. 10), and the head is very strongly elevated medially as figured by Bianchi (1953). All *Phaulothrips* species have long curved metathoracic sternopleural sutures which arise close to the mesothoracic border. Antennal segments III and IV each bear two sense cones (Fig. 45), but due to the dark colour of the head long, curved maxillary guides have been

observed in only a few specimens. *P. agrestis* and *uptoni* are unusual in having two or more pairs of sigmoid wing-retaining setae (Fig. 44).

SPECIES INCLUDED

agrestis (Bagnall, 1924: 628–9) (*Tetraceratothrips*). Holotype ♂, AUSTRALIA (BMNH).
anici Mound, 1974*a*: 82–3. Holotype ♀, AUSTRALIA (ANIC).
barretti Mound, 1974*a*: 83. Holotype ♂, AUSTRALIA (ANIC).
caudatus Bagnall, 1932: 510–1. Holotype ♀, AUSTRALIA (BMNH).
fuscus Moulton, 1935: 100. Holotype ♀, AUSTRALIA (CAS).
 punctatus Rayment, 1948: 257–8 (*Cladothrips*). Syntypes ♂ ♀, AUSTRALIA (ANIC).
inquilinus (Kelly, 1934: 73) (*Kaleidothrips*). Holotype ♀, AUSTRALIA (ANIC). **Comb. n.**
longitubus Girault, 1928: 2. Holotype ?♀, AUSTRALIA (QMB).
magnificus (Bianchi, 1953: 106–7) (*Docessissophothrips*). Holotype ♀, SAMOA (BPBM). **Comb. n.**
sibylla Mound, 1974*a*: 84–5. Holotype ♀, AUSTRALIA (ANIC).
uptoni Mound, 1974*a*: 85–6. Holotype ♀, AUSTRALIA (ANIC).
vuilleti Hood, 1918*b*: 147–8. Holotype ♂, AUSTRALIA (USNM).
 portentosus Karny, 1920*c*: 40–4 (*Titanothrips*). Holotype ♂, AUSTRALIA (NRS).

PRIESNERIANA Ananthakrishnan

(Figs 16, 48)

Priesneriana Ananthakrishnan, 1956*b*: 138. Type-species: *Gnophothrips kabandha* Ramakrishna, by monotypy.

This genus was erected for a single species, from southern India, which has the general appearance of an *Ethirothrips* species (particularly to those species previously placed in *Uredothrips*), but which possesses well-developed metathoracic sternopleural sutures. The maxillary stylets of *kabandha* are retracted to the compound eyes, but although arched towards each other medially they are about one-fifth of the head width apart (Fig. 16). The two Australian species here transferred to this genus have stylets rather similar to *kabandha*, but *amneius* (from New Guinea, Australia and New Zealand) has the stylets meeting medially. These three species resemble *kabandha* in having the eyes reduced and directed forwards, although *uptoni* is unusual in that antennal segments VII–VIII are partially fused. *Priesneriana* is closely related to *Cryptothrips* but has four sense cones on antennal segment IV (Fig. 48), and the eyes are reduced in size.

SPECIES INCLUDED

amneius (Mound, 1974*a*: 42) (*Cryptothrips*). Holotype ♀, NEW GUINEA (ANIC). **Comb. n.**
kabandha (Ramakrishna, 1928: 293–4) (*Gnophothrips*). Holotype ♂, INDIA (TNA).
laticeps (Hood, 1918*b*: 142–3) (*Cryptothrips*). Holotype ♀, AUSTRALIA (USNM). **Comb. n.**
uptoni (Mound, 1974*a*: 44–5) (*Cryptothrips*). Holotype ♀, NORFOLK IS. (ANIC). **Comb. n.**

PYGOTHRIPS Hood

(Figs 6, 21–23, 36–37, 49)

Pygothrips Hood, 1915: 49–50. Type-species: *Pygothrips rugicauda* Hood, by monotypy.
Barythrips Hood & Williams, 1915: 134–5. Type-species: *Barythrips sculpticauda* Hood & Williams, by monotypy. **Syn. n.**
Diplochelaeothrips Moulton, 1944: 284. Type-species: *Diplochelaeothrips mikrommatos* Moulton, by monotypy. **Syn. n.**

This genus was based originally on a single apterous female collected in Queensland, Australia. Hood (1915) figured the terminal segments of the antenna and abdomen, and Mound (1974*a*) gave outline drawings of the head, stylets and pelta. This species has never been collected again, although a damaged apterous female which may be conspecific has been taken recently near Adelaide, South Australia. Subsequently, 19 species have been described in *Pygothrips*, but re-examination of all but five of these has indicated that more than one phylogenetic group is

involved. Moreover, many of the species are known only from single samples or even single individuals, and so no concept of intraspecific variation has been applied within the group.

The type-species of *Pygothrips* has the maxillary stylets elongate and close together in the middle of the head (cf Fig. 6). In contrast, most species described in the genus have the stylets low and wide apart in the head, and all such species are here referred to the genus *Acallurothrips*. The two genera exhibit a series of characters in common in addition to the swollen tube, but several characters are probably functionally related to the shared habit of raising the tube over the head, thus producing an almost spherical mite-like body outline. For example, the sternites are longer than the tergites, and the pelta, metathorax and antennae are reduced. The functional significance of this behaviour is not obvious, but appears to be defensive.

The species here referred to *Pygothrips* share the following characters. Head longer than wide, stylets long and close together medially (Fig. 6). Antennal segments VII–VIII broadly joined; sense cones often lateral in position, 2 on III, 4 (rarely 2) on IV (Fig. 49). Pronotal epimeral sutures complete or incomplete, praepectus present or absent; mesopraesternum eroded; metathoracic sternopleural sutures present but often broadly eroded (Figs 21–22), also anapleural sutures. Foretarsal tooth usually present in both sexes. Forewing with or without duplicated cilia. Pelta eroded at posterior margin (Figs 36–37); median sternites longer than tergites. Wing-retaining setae often weak; tube expanded to greatly expanded with convex margins, often ridged and constricted apically (Fig. 23).

In addition to *rugicauda* three species have been studied (*albiceps, fortis* and *satanas*) which were described in *Pygothrips* and which agree with the above definition of the genus. Moreover, five further species which have not been studied are retained in the genus on the basis of their original descriptions together with information kindly provided by Steve Nakahara that the types all have stylets deeply retracted and close together medially. Two species described recently in *Cryptothrips* are here transferred to *Pygothrips* because of the swollen tube and presence of four sense cones on the fourth antennal segment. Finally, the type-species of both *Barythrips* and *Diplochelaeothrips* are also referred to *Pygothrips* (N.B. – *B. grandicauda* belongs in *Neosmerinthothrips* q.v.; *B. mathuri* Ananthakrishnan, 1961*a* belongs in the phlaeothripine genus *Hoplothrips*, teste Prof. T. N. Ananthakrishnan *in litt.*).

Barythrips sculpticauda was based on one oedymerous male which has been studied and compared with macropterous females and four, small apterous males from Florida. These all have the same remarkable antennal colour with segments I–II yellow and III–V yellow except for a median dark area on the pedicel. The head and stylets are similar to *rugicauda* although the pelta of the males is almost divided into two parts (Fig. 37). Moreover, the epimeral sutures are usually just complete, the forewings bear 7 to 10 duplicated cilia, and the female lacks a foretarsal tooth.

D. mikrommatos has the epimeral sutures complete, and the forewings bear duplicated cilia. Moreover, this species is sexually dimorphic, the male being unlike other males in *Pygothrips*. The antennal sense cones of *albiceps* arise laterally (as in *Acallurothrips spinicauda*) whereas in *fortis* they arise ventrally, although the head of these two species is similar with a pair of elongate postocellar setae (Fig. 6). The sense cones of *rugicauda* are short and weak, but those of *mikrommatos, satanas* and *sculpticauda* are short and stout. Two macropterous females from Java (in BMNH) have been studied which appear to belong in *Pygothrips*, but these have well-developed foretarsal teeth, about 14 forewing duplicated cilia and the tube, although large, is not rugose; a similar species from Obi Island lacks the foretarsal teeth. Finally, a male has been studied from Singapore which is similar to *rugicauda* females, but has the tube much less enlarged.

Pygothrips as defined here is closely related to *Cryptothrips*. However, these tropical species have four, instead of three, sense cones on the fourth antennal segment, and the tube is enlarged. The head and stylets are similar in the two genera, and both have well-developed metathoracic sternopleural sutures.

SPECIES INCLUDED

albiceps Hood, 1938*c*: 401–2. Lectotype ♀, U.S.A.: Florida (USNM).
**callipygus* Hood, 1952*c*: 164–5. Holotype ♀, BRAZIL (USNM).
fortis Hood, 1938*c*: 402. Holotype ♀, U.S.A.: Florida (USNM).
**longiceps* Hood, 1952*c*: 164. Holotype ♀, BRAZIL (USNM).
**magnicauda* Hood, 1954*a*: 45. Holotype ♀, BRAZIL (USNM).
mikrommatos (Moulton, 1944: 284–5) (*Diplochelaeothrips*). Holotype ♀, FIJI (BPBM). **Comb. n.**
**needhami* Hood, 1938*c*: 397–401. Holotype ♀, U.S.A.: Florida (USNM).
pygus (Mound, 1974*a*: 43) (*Cryptothrips*). Holotype ♀, AUSTRALIA (ANIC). **Comb. n.**
rugicauda Hood, 1915: 50–1. Holotype ♀, AUSTRALIA (USNM).
satanas De Santis, 1957: 3–4. Holotype ♂, ARGENTINA (MLPA).
sculpticauda (Hood & Williams, 1915: 135–6) (*Barythrips*). Holotype ♂, U.S.A.: Florida (USNM). **comb. n.**
shavianus (Bagnall, 1918: 216–7) (*Cryptothrips*). Lectotype ♀, AUSTRALIA (BMNH). **Comb. n.**
**zeteki* Hood, 1934: 420. Holotype ♂, PANAMA (USNM).

Genera of *Allothripina*

This subtribe was erected by Priesner (1961) for six genera, each of which includes species with reduced eyes, although *Illinothrips* is here transferred to the Compsothripina where it appears to be closely related to *Bolothrips*. Sakimura & Bianchi (1977) also referred *Diopsothrips* to the Allothripina, but this genus is here placed in the Diceratothripina as a synonym of *Acalluro-thrips*. Moreover, both *Allidothrips* and *Allopisothrips* have subsequently been described as allothripines.

Four genera recognised here in this subtribe share a unique apomorphy in the form of the terminal sensorium on the maxillary palps. These genera are: *Allopisothrips, Allothrips, Priesneriella* (=*Pygidiothrips* and *Parallothrips*), and *Pseudocryptothrips*. All the species in these genera have the terminal sensorium on the maxillary palps exceptionally large, looking like an extra segment (Fig. 77), whereas in normal Idolothripinae the palps bear a terminal and sub-terminal sensorium which do not differ greatly in size and arise almost at right angles.

Faureothrips is retained in the Allothripina although the only species does not have enlarged maxillary palp sensoria, the metathoracic sternopleural sutures are not developed (they are weak in *Pseudocryptothrips*), and the eighth antennal segment is pedicillate and distinct from the seventh segment. Assuming that the Allothripina have developed from Pygothripina, with which they share the presumably plesiomorphic characteristics involved in the tendency for fusion of antennal segments VII–VIII and the close approximation of the maxillary stylets, then *Faureothrips* must be interpreted as a reversion from the trend toward sclerite reduction. Resemblance of *F. reticulatus* to some *Bolothrips* species is probably due to convergence associated with adaptation to the leaf litter habitat. *Allidothrips* is also retained in this subtribe and is discussed below.

ALLIDOTHRIPS Zur Strassen

(Fig. 64)

Allidothrips Zur Strassen, 1968: 86–7. Type-species: *Allidothrips tricolor* Zur Strassen, by monotypy

Mound (1972*a*) transferred *Allothrips cinctus* Faure to *Allidothrips* as a second species in the genus. These species do not have the terminal sensorium on the maxillary palps exceptionally large, although they share with the other Allothripina a series of characters involving reduction of sclerites. Antennal segment III bears only one sense cone, although segments VII–VIII are fused. The pelta is quite unique in that it appears to be a complete transverse tergite (Fig. 64). This structure might be considered to be part of the same transformation series which includes *Priesneriella gnomus* and *P. seminole* in which the pelta is reduced but transverse (Figs 62–63). Alternatively, *Allidothrips* might be quite unrelated to this group, its larviform appearance being interpreted as indicating development by neotony from some entirely different ancestry.

SPECIES INCLUDED
cinctus (Faure, 1945: 150–2) (*Allothrips*). Holotype ♀, SOUTH AFRICA (NCIP).
tricolor Zur Strassen, 1968: 87–90. Holotype ♀, MOROCCO (SMF).

ALLOPISOTHRIPS Sakimura & Bianchi

Allopisothrips Sakimura & Bianchi, 1977: 498–9. Type-species: *Allopisothrips alakaiensis* Sakimura & Bianchi, by monotypy.

This monobasic genus, based on a single male specimen, is intermediate in structure between *Allothrips* and *Priesneriella*. The fused antennal segments VII–VIII are broadly based (unlike *Allothrips*) but distinct from VI (unlike *Priesneriella*). The meso- and metanota are fused and the pelta reduced, but the major setae are longer than in *Priesneriella* species.

SPECIES INCLUDED
alakaiensis Sakimura & Bianchi, 1977: 489. Holotype ♂, KAUAI Is (BPBM).

ALLOTHRIPS Hood

(Figs 57, 58, 78)

Allothrips Hood, 1908*a*: 372–3. Type-species: *Allothrips megacephalus* Hood, by monotypy.
Bryothrips Priesner, 1925*a*: 6. Type-species: *Bryothrips pillichelus* Priesner, by monotypy. [Synonymised by Stannard, 1957: 92.]

In this genus Mound (1972*a*) recognised only four species, but with two of these divided into a total of 16 subspecies. One reason for this interpretation was the recognition by Stannard (1955) of a cline across North America. Mound (1972*a*) described three forms from Australia as subspecies of *megacephalus*, and suggested that these had been transported artificially by ships trading across the Pacific from the American West Coast. This hypothesis requires testing by collecting further populations of *Allothrips* in western America and Panama, but further evidence for artificial transportation is provided by the record of *brasilianus* in large numbers on the Hawaiian Islands (Sakimura & Bianchi, 1977). *Allothrips* species frequently produce quite large populations in leaf litter but macropterae are rare. This probably leads to reduced gene flow between natural populations resulting in increased structural diversity between populations.

SPECIES INCLUDED
brasilianus Hood, 1955: 101–3. Holotype ♀, BRAZIL (USNM).
megacephalus Hood
  m. acutus Stannard, 1955: 154–5 (*watsoni acuta*). Holotype ♀, MEXICO (INHS).
  m. greensladei Mound, 1972*a*: 30. Holotype ♀, AUSTRALIA (ANIC).
  m. megacephalus Hood, 1908*a*: 373. Lectotype ♀, U.S.A.: Illinois (USNM).
  m. mexicanus Stannard, 1955: 154 (*watsoni mexicana*). Holotype ♀, MEXICO (INHS).
  m. prolixus Mound, 1972*a*: 30–1. Holotype ♀, AUSTRALIA (ANIC).
  m. stannardi Mound, 1972*a*: 31–2. Holotype ♀, AUSTRALIA (ANIC).
  m. watsoni Hood, 1939*b*: 600–2. Holotype ♀, U.S.A.: Florida (USNM).
nubillicauda Watson, 1935: 60–1. Syntypes ♂ ♀, U.S.A.: Florida, Alabama (FSAC).
pillichellus (Priesner)
  p. acaciae Faure, 1945: 152–4. Holotype ♀, SOUTH AFRICA (NCIP).
  p. africanus Faure, 1933: 57–9. Holotype ♀, SOUTH AFRICA (NCIP).
  p. aureus Stannard, 1955: 155. Holotype ♂, U.S.A.: California (INHS).
  p. bicolor Ananthakrishnan, 1964*a*: 83–4. Holotype ♀, INDIA (TNA).
  p. biminianus Stannard, 1955: 155 (*watsoni biminiana*). Holotype ♀, BAHAMAS (INHS).
  p. bournieri Mound, 1972*a*: 35–6. Holotype ♀, FRANCE (MNHN).
  ****p. indicus*** Ananthakrishnan, 1958: 277–8. Holotype ♀, INDIA (TNA).
  p. montanus Ananthakrishnan, 1968*b*: 53. Holotype ♀, INDIA (TNA).
  p. pillichellus (Priesner, 1925*a*: 6–7) (*Bryothrips*). Holotype ♀, HUNGARY (SMF).

FAUREOTHRIPS Priesner

(Figs 66, 67)

Faureothrips Priesner, 1949: 116–7. Type-species: *Cryptothrips reticulatus* Trybom, by monotypy.

This monobasic genus from southern Africa is difficult to place phylogenetically. The antennae are similar to *Pseudocryptothrips*, with two sense cones on segment III and four on IV; however, segment VIII is slender and pedicillate. Moreover, as in *Pseudocryptothrips*, the stylets are fairly wide apart, there is a pair of stout interocellar setae with expanded apices, and the eyes are somewhat reduced (Fig. 67). However, unlike the other Allothripina, *Faureothrips* does not have the terminal sensorium on the maxillary palps exceptionally large, and the metathoracic sternopleural sutures are not developed (N.B. they are only weakly developed in *Pseudocryptothrips*). The pronotal epimeral sutures are incomplete, the praepectus is present, the pelta broad (Fig. 66), but the metanotum bears more than 10 minor setae in addition to a pair of widely spaced major setae.

SPECIES INCLUDED

reticulatus (Trybom, 1912: 9–13) (*Cryptothrips*). Syntypes ♂ ♀, SOUTH AFRICA (NMG).

PRIESNERIELLA Hood

(Figs 59–63, 68–72, 74–77, 79–83)

Priesneriella Hood, 1927*b*: 198–9. Type-species: *Priesneriella citricauda* Hood, by monotypy.
Pygidiothrips Hood, 1938*c*: 389–90. Type-species: *Pygidiothrips seminole* Hood, by monotypy. **Syn. n.**
Parallothrips Hood, 1939*b*: 602. Type-species: *Parallothrips thomasi* Hood, by monotypy. **Syn. n.**
Embothrips Dyadechko, 1961: 688–9. Type-species: *Embothrips tubversicolor* Dyadechko, by monotypy. [Synonymised with *Parallothrips* by Dyadechko, 1964: 307.]

Seven species are listed under the above four generic names, and a further new species is described below from New Zealand. Several characters in these eight species exhibit transformation series involving reduction or fusion. Traditional interpretations of this variation would require five genera although the present authors regard these species as constituting a single holophyletic group. That is, the group was derived once from *Allothrips*-like ancestors. *Allopisothrips* appears to be the sister-group. The apomorphy on which this conclusion is based is the broad and close union of antennal segment VI with segments VII & VIII (Figs 79–83). The seven species examined have the following characteristics.

P. thomasi. Maxillary stylets close together; ocellar setae stout; antennal III with 2 sense cones, VI subequal in length to VII+VIII; meso- and metanota fused; pelta with median lobe, and wide but slender base; sternite IV with 4 discal setae; tube width 0·9 times length (Figs 60, 68, 82).

P. mavromoustakisi. As *thomasi* but pelta larger; tube width 0·8 times length.

P. luctator. As *thomasi*; tube width 0·76 times length.

P. clavicornis. Maxillary stylets wide apart; ocellar setae stout; antennal III with 0(?1) sense cones, VI slightly larger than VII+VIII but these have a partial suture; meso- and metanota not quite fused; pelta with median lobe and wide base; sternite IV with 2 discal setae; tube width 0·7 times length (Figs 59, 70, 81).

P. gnomus. Maxillary stylets wide apart; ocellar setae small; antennal III with 0(or 1) sense cones, VI shorter than VII+VIII; meso- and metanota separate; pelta slender and transverse; sternite IV with 0 discal setae; tube width 0·68 times length (Figs 62, 71, 74, 79).

P. citricauda. Stylets wide apart; ocellar setae small; antennal III with 0 sense cones, VI fused to VII+VIII; meso- and metanota separate; pelta as in *thomasi*; sternite IV with 0 discal setae; tube width 0·8 times length (Figs 61, 80).

P. seminole. Stylets wide apart; ocellar setae small; antennal III with 1 sense cone, VI fused to VII+VIII; meso- and metanota separate; pelta slender and transverse; sternite IV with 0 discal setae; tube width 1·1 times length (Figs 63, 69, 72, 75, 76, 83).

The following characters are plesiomorphic in this group, in that they also occur in *Allothrips* and *Pseudocryptothrips*: stylets close together; ocellar setae long and stout; antennal III with 2

sense cones, terminal segments separate; meso and metanota separate; pelta large and rounded; sternites with numerous discal setae; tube width 0·5 times length. Most of these characters (apart from the fusion of the meso- and metanota) are in their most derived state in the smallest species.

SPECIES INCLUDED

citricauda Hood, 1927*b*: 199. Lectotype ♀, U.S.A.: California (USNM).
clavicornis (Knetchtel, 1936: 159–60) (*Hoplothrips*). Syntypes ♂, RUMANIA (unknown). **Comb. n.**
tuzetae Bournier, 1956: 160–3 (*Parallothrips*). Holotype ♀, FRANCE (BCM).
gnomus sp. n. Holotype ♀, NEW ZEALAND (NZAC).
luctator (zur Strassen, 1966: 3–6) (*Parallothrips*). Holotype ♀, TENERIFFE (SMF). **Comb. n.**
mavromoustakisi (Crawford, 1948: 213–5) (*Parallothrips*). Holotype ♀, CYPRUS (USNM). **Comb. n.**
f. *flaviceps* Bournier, 1962: 43. Types not specified, FRANCE (BCM).
seminole (Hood, 1938*c*: 390–2) (*Pygidiothrips*). Holotype ♀, U.S.A.: Florida (USNM). **Comb. n.**
thomasi (Hood, 1939*b*: 603–5) (*Parallothrips*). Holotype ♀, U.S.A.: Texas (USNM). **Comb. n.**
*tubversicolor (Dyadechko, 1961: 688–9) (*Embothrips*). Syntypes ♂ ♀, U.S.S.R.: Kiev (Acad. Sci., U.S.S.R.). **Comb. n.**

Priesneriella gnomus sp. n.

(Figs 62, 71, 74, 79)

Apterous ♀. Colour brown, inner margin of forefemora and apex of antennal II paler; basal two-thirds of tube yellow. Head scarcely longer than wide; eyes small with only about 5 ommatidia ventrally; ocellar-setae small, postocular setae long and acute (Fig. 71); stylets wide apart, maxillary palps with large terminal sensorium (Fig. 77). Antennae with 7 segments, VI separate from VII+VIII; IV with 2 sense cones, III without sense cones or with one small one (6 μm) (Fig. 79). Pronotum transverse, epimeral sutures incomplete, anterior setae reduced. Praepectus and probasisternum absent; metathoracic sterno-pleural sutures broad. Meso- and metanota separate. Pelta very short but wide and close to anterior margin of tergite II (Fig. 62); tergites without sculpture, major setae long and slender (Fig. 74); tube with sides almost straight, scarcely constricted at apex; sternites II–IV without discal setae.

Measurements (holotype ♀ in μm). Body length 1500 (extended). Head, length 150; median width 150; postocular setae 80. Pronotum, length 110; width 220; major setae – am 25, aa 20, ml 25, epim 120, pa 120. Tergite IX median dorsal setae 150. Tube, length 110; basal width 75; terminal setae 140. Antennal segments II–VII length 45, 36, 40, 42, 45, 50.

SPECIMEN STUDIED

Holotype ♀, **New Zealand**: South Island, 25 ml west of Christchurch, Kowai Bush, on dead branch of *Griselinia littoralis*, 13.x.1972 (*V. F. Eastop*) (NZAC).

COMMENTS. This new species has the distal antennal segments similar to *thomasi* (type-species of *Parallothrips*), but the third segment similar to *citricauda* and *seminole*. The left antenna of the holotype has a small (6 μm) sense cone externally, but this is not visible on the right antenna (similar variation occurs in *clavicornis* from southern France). The meso- and metanota are separate as in *citricauda*, and the pterothoracic endofurca is stout as in that species and *mavromoustakisi*. *P. gnomus* is probably not native to New Zealand.

PSEUDOCRYPTOTHRIPS Priesner

(Figs 56, 65, 73)

Pseudocryptothrips Priesner, 1919: 105. Type-species: *Pseudocryptothrips meridionalis* Priesner, by monotypy.

The type-species of this genus is very similar to *Allothrips* species in the structure and chaetotaxy of the head, and in the form of the pelta and maxillary palp sensoria. However, antennal segments VII–VIII are separated by a complete suture, and IV bears four sense cones (Fig. 73). Moreover, the meso- and metanota are rather more fused than in *Allothrips* species, although the meso- and metasterna are less eroded, and the mesonotum bears a short wing lobe (60 μm) laterally with one or two setae. Specimens of this genus have been studied from the following countries: Mexico (3 ♀, 2 ♂), Barbados (1♀), Trinidad (2 ♀), Transvaal (2 ♂), Kenya (1 ♀),

France (1 ♀). However, the present authors are not convinced that this material represents more than one species, although three species have been described in the genus. *P. remotus* Bianchi (1947) from Hawaii was transferred to *Apterygothrips* in the Phlaeothripinae by Sakimura & Bianchi (1977).

SPECIES INCLUDED
fuscicauda (Trybom, 1912: 13–5) (*Cryptothrips*). Holotype ♀, SOUTH AFRICA (NMG).
proximus Faure, 1933: 55–7. Holotype ♂, SOUTH AFRICA (NCIP).
****gradatus*** (Hood, 1925*b*: 64) (*Cryptothrips*). Holotype ♀, TOBAGO (USNM).
meridionalis Priesner, 1919: 105–6. Syntypes ♀ ♂, ALBANIA (SMF).

Genera of Compsothripina

This group was erected by Karny (1921*a*) as a subfamily to include four generic names. Two of these are now placed in Elaphrothripina as synonyms of *Anactinothrips*, the other two are here treated as a single genus. The subtribe is here reinterpreted to include an ill-defined series of Pygothripini mainly found at soil level in association with grasses and litter. The species share a combination of the following characters: usually apterous; antennal segment VIII distinct from VII; antennal segment IV with 3 (or 2) sense cones, III with 2 or 1 sense cones; eyes frequently reduced laterally, but often extended ventrally; praepectus present; mesopraesternum entire; metathoracic sternopleural sutures well developed or absent; tube short with sides straight.

Bolothrips species, together with the related monobasic genera *Illinothrips*, *Loyolaia* and *Anaglyptothrips*, are here brought into the same subtribe as the ant-mimicking species of *Compsothrips* (together with *Leptogastrothrips* and *Oedaleothrips*). This decision is based on a comparison of *Bolothrips cingulatus*, which has long metathoracic sternopleural sutures (Fig. 98), with species of *Compsothrips* from the Mediterranean region. In this region several species are known which are intermediate in structure between *Bolothrips* and *Compsothrips* (*B. cingulatus, B. insularis, C. albosignatus, C. maroccanus* and *C. uzeli*). These two genera probably constitute sister-groups, of which one has radiated mainly in the Holarctic Region, and the other mainly in the tropics where it has produced remarkable ant-mimics.

In Compsothripina the plesiomorphic condition of the antennal sensoria is regarded as: III with 2 sense cones, IV with 3 sense cones. However, there are four species of *Bolothrips* with the ventral sense cone missing on segment IV (two species Mediterranean, two species South African) (Fig. 118), and this derived condition is maintained in *Compsothrips* (Figs 113, 114). The ventral prolongation of the eyes may be plesiomorphic in this group, but is possibly functionally correlated with the habit of living at the base of grasses. The eyes are not prolonged ventrally in *B. pratensis* (Fig. 96) and *I. rossi* (N. America) (Fig. 104), *L. indica* (India) (Fig. 105), *A. dugdalei* (New Zealand) (Fig. 103), and only weakly so in *C. albosignatus* (Fig. 84), *C. maroccanus* and *B. insularis*. As a result the subtribe is not easy to define, but on the basis of the antennal sense cone formula it may be the sister-group of the Gastrothripina.

In contrast to Stannard (1976) *Hartwigia* is here transferred to the Elaphrothripina in the Idolothripini because of the presence of two pairs of wing-retaining setae on each tergite, and also the absence of metathoracic sternopleural sutures.

ANAGLYPTOTHRIPS gen. n.

(Figs 97, 103, 106, 115)

Type-species: *Anaglyptothrips dugdalei* sp. n.

Medium sized, apterous, yellowish Pygothripini with body surface, including legs and antennae, reticulate. Antennae 8-segmented, VIII not constricted at base, 2 sense cones on III, 3 on IV (Fig. 115). Head longer than wide, protruding in front of small rounded eyes (Fig. 103); postocular setae of ♀ scarcely longer than minor setae, but half as long as eye in ♂; maxillary stylets V-shaped and low in head; mouth cone short and rounded. Pronotum with no long setae, epimeral sutures complete (Fig. 103). Foretarsal tooth absent in ♀, present in ♂. Mesonotum transversely rectangular; metanotum transverse with explanate lateral margins. Praepectus small (Fig. 103); probasisternum large; mesopraesternal posterior margin short; metathoracic

sternopleural sutures long and curved (Fig. 97). Pelta broadly oval (Fig. 106); tergal discal setae numerous, posteromarginal setae short and blunt on anterior segments but longer on posterior segments; tube moderately long, margins straight; sternal discal setae in one transverse row.

This new genus is considered to be related to *Bolothrips* because of the presence of three sense cones on antennal segment IV, and because of the long curved metathoracic sternopleural sutures as in *B. varius* and *B. cingulatus* (Fig. 98). It is distinguished from all other Idolothripinae by the sculpture, pale body colour, rounded eyes and short postocular setae. *Faureothrips reticulatus* is the only species of similar appearance, but that has four sense cones on antennal segment IV and lacks the sternopleural sutures. The new species for which this new genus is erected has been collected only in New Zealand, but as discussed below it is probably introduced to that country.

Anaglyptothrips dugdalei sp. n.

Apterous ♀. Colour brownish yellow, posterior segments darkest; eyes and antennal segments VI–VIII dark brown, V light brown; major setae on posterior abdominal segments pale. Sculpture of head evenly reticulate in posterior third but irregular medially (Fig. 103); compound eyes with about 10 ommatidia. Pronotal sculpture weaker, major setae not distinguishable from minor setae (Fig. 103). Metanotum with one pair of major setae medially and 10 pairs of minor setae. Pelta with strong sub-basal line of sculpture (Fig. 106). Tergites strongly reticulate.

Measurements (holotype ♀ in μm). Body length (extended) 2450. Head, length 300; width across cheeks 200; postocular setae 15. Pronotum, length 195; width 270; epimeral setae 10. Metanotal median setae 20. Tergite IX setae B_1–B_3 60, 70, 100. Tube, length 195; maximum width 95; terminal setae 100. Antennal segments III–VIII length 70, 60, 55, 55, 45, 30.

Apterous ♂. Similar to ♀ except postocular setae longer (45 μm), foretarsus with stout curved tooth, metanotal median setae short (15 μm).

SPECIMENS STUDIED

Holotype ♀, **New Zealand**: North Island, Waiwera, at base of grasses, 21.viii.1968 (*L. A. Mound* 802) (NZAC).

Paratypes. **New Zealand**. North Island: 5 ♀ collected with holotype; Huia, near Auckland, 1 ♂ at base of grass tussock, 24.i.1979 (*L. A. Mound* 1353); Auckland, Lynfield, 3 ♀ under dead sheep in field, 6.iii.1977 (*G. Kuschel*) (NZAC; BMNH).

COMMENTS. The sites at which this species has been collected all had a ground cover of European grasses. In New Zealand it is relatively unusual for native species to be found in association with non-native habitats (Mound & Walker, 1982). Moreover, despite extensive sampling of leaf litter in New Zealand, *A. dugdalei* has not been found in areas of native flora. Therefore it seems likely that *Anaglyptothrips* is itself introduced to New Zealand from some other continent.

BOLOTHRIPS Priesner

(Figs 94–96, 98, 99, 101, 102, 118, 119)

Bolothrips Priesner, 1926*a*: 90. Type-species: *Phloeothrips bicolor* Heeger, by original designation.
Bolothrips (Botanothrips) Hood, 1939*b*: 605–6. Type-species: *Bolothrips pratensis* Hood, by original designation.
Boloadelothrips Moulton, 1949: 489. Type-species: *Boloadelothrips africanus* Moulton, by monotypy. **Syn. n.**

A revision of this genus, including a key to 14 species, was given by Mound (1974*b*). Although widespread in the Holarctic, it is also represented in Africa by several species. *Illinothrips* from North America, *Loyolaia* from India, and *Anaglyptothrips* are here regarded as derivatives from *Bolothrips* because of the presence of three sense cones on the fourth antennal segment (Fig. 119).

Botanothrips was proposed for species with the eyes not prolonged ventrally (Fig. 96), but this varies within species (e.g. *varius*) and does not define a real phylogenetic group. *Boloadelothrips* is also placed in synonymy here, the only species having antennae similar to *Bolothrips dentis*

(1 sense cone on III, 2 on IV; VII–VIII broadly joined). Both *dentis* and *africanus* have metathoracic sternopleural sutures, but the former has long interocellar setae and the female bears a foretarsal tooth. Most *Bolothrips* species have lost the metathoracic sternopleural sutures, but these are present in *insularis* and the closely related *varius* (N.B. not *icarus*, Fig. 99), and are exceptionally long in *cingulatus* (Fig. 98). *Bolothrips* is here interpreted as the sister-group of *Compsothrips* which appears to replace it ecologically in much of the tropics.

SPECIES INCLUDED

africanus (Moulton, 1949: 489–92) (*Boloadelothrips*). Holotype ♀, SOUTH AFRICA (BMNH). **Comb. n.**
bicolor (Heeger, 1852*b*: 477–8) (*Phlaeothrips*). Syntypes ?sex, AUSTRIA (?lost).
f. *brevicornis* Priesner, 1928*a*: 687. Holotype ♀, HUNGARY (SMF).
andrei Watson, 1933: 49–50 (*Oedaleothrips*). Syntypes ♀ ♂, U.S.A.: Iowa (FSAC).
cinctus Faure, 1943: 86–7. Syntypes ♀, SOUTH AFRICA (NCIP).
cingulatus (Karny, 1916: 92) (*Cryptothrips*). Syntypes? sex, AUSTRIA (SMF).
dentipes (Reuter, 1880: 12–4) (*Phloeothrips*). Syntypes ?sex, FINLAND (?lost).
bagnalli Karny, 1916: 94 (*Cryptothrips*). Syntypes ?sex, SARDINIA (?lost).
dentis Faure, 1954*b*: 155–9. Holotype ♂, SOUTH AFRICA (NCIP).
****embotyi*** Faure, 1943: 87–9. Syntypes ♀ ♂, SOUTH AFRICA (NCIP).
gilvipes (Hood, 1914: 169–70) (*Cryptothrips*). Holotype ♀, U.S.A.: Maryland (USNM).
litoreus Hood, 1939*b*: 609–12. Holotype ♀, U.S.A.: Texas (USNM).
icarus (Uzel, 1895: 323–3) (*Cryptothrips*). Syntypes ♂ ♀, CZECHOSLOVAKIA (?lost).
var. *pallipes* Uzel, 1895: 233. Syntypes ♀♂, CZECHOSLOVAKIA (?lost).
insularis (Bagnall, 1914*b*: 295) (*Cryptothrips*). Holotype ♀, CANARY ISLAND (BMNH).
icarus tuberculatus Priesner, 1922: 105 (*Cryptothrips*). Holotype ♀, YUGOSLAVIA (SMF).
brachyurus Bagnall, 1927: 573–4 (*Cryptothrips*). Lectotype ♂, FRANCE (BMNH).
arenarius Priesner, 1950: 36–7. Syntypes ♀ ♂, EGYPT & SYRIA (SMF).
italicus Mound, 1974*b*: 122. Holotype ♀, ITALY (USNM).
pratensis Hood, 1939*b*: 606–9. Holotype ♀, U.S.A.: Texas (USNM).
****rachiphilus*** Cott, 1956: 181–2. Holotype ♀, U.S.A.: California (?lost).
schaferi (Thomasson & Post, 1966: 31–2) (*Nesothrips*). Holotype ♀, U.S.A.: North Dakota (INHS).
varius Hartwig, 1948: 110–2. Holotype ♀, SOUTH AFRICA (NCIP).

COMPSOTHRIPS Reuter

(Figs 84–86, 100, 107, 108, 111–114)

Compsothrips Reuter, 1901: 214. Type-species: *Phloeothrips albosignata* Reuter, by monotypy.
Macrothrips Buffa, 1908: 4. Type-species: *Phloeothrips albosignatus* Reuter, by monotypy.
Leurothrips Bagnall, 1908: 196. Type-species: *Leurothrips albomaculata* Bagnall, by original designation. [Synonymised by Priesner, 1928.]
Leptogastrothrips Trybom, 1912: 28. Type-species: *Leptogastrothrips reuteri* Trybom, by monotypy. [Synonymised by Priesner, 1964.]
Oedaleothrips Hood, 1916: 64. Type-species: *Oedaleothrips hookeri* Hood, by original designation. [Synonymised by Priesner, 1964.]
Myrmecothrips Watson, 1920: 20. Type-species: *Myrmecothrips querci* Watson, by original designation. [Synonymised with *Oedaleothrips* by Watson, 1924.]
Myrmecothrips Priesner, 1926*b*: 485–8. Type-species: *Myrmecothrips dampfi* Priesner, by original designation. [Junior homonym of *Myrmecothrips* Watson, 1920] [Synonymised with *Oedaleothrips* by Hood, 1936.]
Formicothrips Priesner, 1927: 479. [Replacement name for *Myrmecothrips* Priesner.] [Synonymised with *Oedaleothrips* by Hood, 1936.]

Stannard (1976) recognised three genera in this group, although apparently accepting that they constituted together a holophyletic assemblage. *Compsothrips* was used for one species, *albosignatus*, with the head produced into a cone over the antennal bases (Fig. 84), the mesonotum short and transversely rectangular, and the metanotum rectangular without a

median raised area. *Oedaleothrips* was reserved by Stannard for the North American species of the group on the argument that in these the head is greatly swollen behind the eyes (Fig. 86) and the metanotum produced medially into a cone or node. *Leptogastrothrips* was used for the rest of the species in the group from the Old World as well as the Neotropics. This division into three genera is not accepted here for the following reasons. One particularly small male of *C. albosignatus* from Greece has been studied which lacks a head cone; this structure probably varies in size allometrically. Moreover, although the mesonotum of most species placed in *Leptogastrothrips* and *Oedaleothrips* is relatively long (Fig. 111) and quite unlike the transverse mesonotum of *albosignatus* (Fig. 112), this is not true of *uzeli* which has a typical '*Leptogastrothrips*' head but a mesonotum and metanotum similar to *albosignatus*. The species *maroccanus* is also intermediate between the two groups. Similarly, although the head and metanotum of certain North American species are remarkable in structure, the head of *yosemitae* is intermediate between *Leptogastrothrips* and *Oedalothrips*, and the metanota of *reuteri* and *hookeri* (the two type-species) are essentially similar. *Hartwigia,* another ant-mimic which is superfically similar, is here transferred to the Elaphrothripina (p. 68).

Compsothrips is here interpreted as the sister-group of *Bolothrips* which it largely replaces in the tropics. The genus is circumtropical, but with most species in Africa and South America, one species-group in North America, and a few species in the North African/Mediterranean region. The species of continental areas appear to exist as a series of intergrading populations which are difficult to classify, as has been reported for other groups of apterous thrips living at soil level (Mound, 1972*b*). The metathoracic sternopleural sutures are more strongly developed in this genus than in any other idolothripines (Fig. 100), possibly correlating with the narrowed ant-like body form.

SPECIES INCLUDED

****aeneus*** (Hood, 1937*a*: 280–5) (*Oedaleothrips*). Holotype ♀, PERU (USNM). **Comb. n.**
albosignatus (Reuter, 1884: 290–1) (*Phloeothrips*). Syntypes ♀ ♂, ALGERIA (?lost).
    albomaculata Bagnall, 1908: 196–8 (*Leurothrips*). Holotype ♀, no data (BMNH).
baileyi (Hood, 1941: 193–5) (*Oedaleothrips*). Holotype ♀, U.S.A.: Kansas (USNM). **Comb. n.**
****bicolor*** Priesner, 1921: 213–5. Syntypes ♀ ♂, PARAGUAY (SMF).
brasiliensis (Hood, 1952*c*: 166–7) (*Oedaleothrips*). Lectotype ♀, BRAZIL (USNM). **Comb. n.**
brunneus (Hood, 1941: 187–90) (*Oedaleothrips*). Holotype ♀, U.S.A.: Florida (USNM). **Comb. n.**
congoensis (Hood, 1952*b*: 204–9) (*Oedaleothrips*). Lectotype ♀, CONGO (USNM). **Comb. n.**
****dampfi*** (Priesner, 1926*b*: 488–9) (*Myrmecothrips*). Holotype ♂, MEXICO (?lost). **Comb. n.**
graminis (Hood, 1936*c*: 265–9) (*Oedaleothrips*). Holotype ♀, TRINIDAD (USNM). **Comb. n.**
****hoodi*** (De Santis, 1958: 98–9) (*Leptogastrothrips*). Holotype ♀, ARGENTINA (MLPA). **Comb. n.**
hookeri (Hood, 1916: 64–5) (*Oedaleothrips*). Holotype ♀, U.S.A.: Texas (USNM). **Comb. n.**
    bradleyi Hood, 1937*b*: 111–3 (*Oedaleothrips*). Holotype ♀, U.S.A.: Florida (USNM).
    campestris Hood, 1941: 190–3 (*Oedaleothrips*). Holotype ♀, U.S.A.: Florida (USNM).
jacksoni (Hood, 1925*c*: 137–8) (*Oedaleothrips*). Holotype ♀, U.S.A.: Colorado (USNM). **Comb. n.**
    hubbeli Watson, 1931: 341–2. Holotype ♀, U.S.A.: Oklahoma (FSAC).
maroccanus Priesner, 1964: 146. Holotype ♀, MOROCCO (?SMF).
****oneillae*** Bournier, 1974: 153–6. Holotype ♀, ANGOLA (MDA).
****pampicolla*** (De Santis, 1958: 100–2). (*Leptogastrothrips*). Holotype ♀, ARGENTINA (MLPA). **Comb. n.**
****querci*** (Watson, 1920: 20–1) (*Myrmecothrips*). Syntypes ♀ ♂, U.S.A.: Florida (FSAC). **Comb. n.**
ramamurthiii (Ananthakrishnan, 1964*b*: 111–3) (*Oedaleothrips*). Syntypes ♀ ♂, INDIA (TNA). **Comb. n.**
    ramamurthii indicus Ananthakrishnan, 1973*b*: 120. [Replacement name for *ramamurthii bicolor* Ananthakrishnan, 1966: 11, nec *bicolor* Priesner.]
reuteri (Trybom, 1912: 29–31) (*Leptogastrothrips*). Holotype ♀, SOUTH AFRICA (NMG).
    recticeps Hood, 1925*a*: 293–5. Holotype ♀, SOUTH AFRICA (USNM).
    amabilis Jacot-Guillarmod, 1942: 67–71 (*Oedaleothrips*). Holotype ♀, SOUTH AFRICA (AMG).
    aemulus Jacot-Guillarmod, 1942: 71–4 (*Oedaleothrips*). Holotype ♀, SOUTH AFRICA (AMG).
****sinensis*** (Pelikan, 1961: 306–8) (*Oedaleothrips*). Holotype ♀, CHINA (Pelikan Coll.).
****sumatranus*** Priesner, 1928*c*: 54–5. Holotype ♀, SUMATRA (?lost).
****timur*** (Pelikan, 1961: 302–6) (*Oedaleothrips*). Holotype ♀, U.S.S.R. (Pelikan Coll.).
****tristis*** (Cott, 1956: 186–8) (*Oedaleothrips*). Holotype ♀, U.S.A.: California (?lost). **Comb. n.**
uzeli (Hood, 1952*a*: 134–40) (*Oedaleothrips*). Holotype ♀, ITALY (USNM).

* ***walteri*** (Watson, 1933: 48–9) (*Oedaleothrips*). Holotype ♀, ARGENTINA (FSAC). **Comb. n.**
yosemitae (Moulton, 1929*a*: 135–6) (*Formicothrips*). Holotype ♀, U.S.A.: California (CAS). **Comb. n.**

ILLINOTHRIPS Stannard

(Figs 104, 110, 116)

Illinothrips Stannard, 1954: 193–5. Type-species: *Illinothrips rossi* Stannard, by monotypy.

This monobasic genus was compared originally to *Pseudocryptothrips* and to *Gastrothrips acuticornis*. However, the pelta (Fig. 110) and abdomen are typical of *Bolothrips*, and the antennae essentially similar to members of that genus (3 sense cones on IV, but only 1 on III) (Fig. 116). The head, with the eyes small and cheeks incut behind the eyes (Fig. 104), is unlike most species of *Bolothrips*, although *B. pratensis* from North America is intermediate. Only one female of *rossi* has been examined; according to Stannard the male bears a tooth-like projection in front of the mesothoracic spiracle. The metathoracic sternopleural sutures are retained in *rossi,* which implies that the species is not derived from the present North American *Bolothrips* fauna.

SPECIES INCLUDED
rossi Stannard, 1954: 195–6. Holotype ♀, U.S.A.: Illinois (INHS).

LOYOLAIA Ananthakrishnan

(Figs 105, 109, 117)

Loyolaia Ananthakrishnan, 1964*b*: 106–7. Type-species: *Loyolaia indica* Ananthakrishnan, by monotypy.

As indicated in the original description, this monobasic genus from India is similar in appearance to *Illinothrips*, and the antennae have a similar sense cone arrangement (1 on III, 3 on IV) (Fig. 117). The metathoracic sternopleural sutures are present, and the prothoracic epimeral sutures complete, but unlike *Illinothrips* the pelta of *indica* is trilobed (Fig. 109). This species is probably derived from the holarctic genus *Bolothrips*.

SPECIES INCLUDED
indica Ananthakrishnan, 1964*b*: 107–8. Syntypes ♀ ♂, INDIA (TNA).

Genera of Gastrothripina

This subtribe was erected by Priesner (1961) for a series of 13 generic names, most of which through subsequent reinterpretation are now placed elsewhere. As a result only *Gastrothrips*, with seven generic synonyms, remains in the subtribe, the species of which (in common with most *Bolothrips* species) are unusual amongst Idolothripinae in having three sense cones on the fourth antennal segment (Fig. 93). In *Gastrothrips* species, however, these sense cones are relatively short and stout. The metathoracic sternopleural sutures are present (Fig. 128), but unlike *Bolothrips* in the Compsothripina, the eyes are usually rounded and not prolonged ventrally (Fig. 120), and the pelta, although variable, is basically triangular with lateral wings rather than rounded (Figs 121–124). Gastrothripina is possibly the sister-group of Compsothripina, the two groups having adopted different habitats; the former is common on dead twigs and branches in the tropics, the latter is found in grass tussocks and leaf litter in both tropical and temperate regions.

GASTROTHRIPS Hood

(Figs 87–93, 120–129)

Gastrothrips Hood, 1912*c*: 156. Type-species: *Gastrothrips ruficauda* Hood, by original designation.
Goetothrips Priesner, 1925*c*: 316. Type-species: *Goetothrips terrestris* Priesner, by monotypy. [Synonymised by Johansen, 1978*c*: 277.]
Isopterothrips Bagnall, 1926: 553. Type-species: *Isopterothrips tenuipennis* Bagnall, by monotypy. **Syn. n.**

Syncerothrips Hood, 1935*b*: 191–2. Type-species: *Syncerothrips harti* Hood, by monotypy. **Syn. n.**
Probolothrips Moulton, 1941: 319. Type-species: *Probolothrips hambletoni* Moulton (now regarded as a synonym of *abditus*), by monotypy. [Synonymised by Hood, 1952: 163.]
Pharetrothrips Priesner, 1952*a*: 195. Type-species: *Agnostochthona curvidens* Karny, by monotypy. **Syn. n.**
Percnothrips Ananthakrishnan, 1967: 233. Type-species: *Percnothrips turbinatus* Ananthakrishnan, by monotypy. **Syn. n.**
Paragastrothrips Zur Strassen, 1977: 59–60. Type-species: *Paragastrothrips mauli* Zur Strassen, by monotypy. **Syn. n.**

A definition of this genus, with a key to 16 species, was given by Mound (1974*b*). The Neotropical species referred to in couplets 5 to 15 of that key, together with *gurdus, harti* and *terrestris*, form a closely related and presumably holophyletic group. One species, *terrestris*, was placed in a separate genus *Goetothrips* because the interantennal projection is relatively long. However, *Gastrothrips fulviceps* has a similar but shorter projection. Similarly, *harti* was placed separately in *Syncerothrips* because of the partial fusion of antennal segments VII–VIII (cf. Fig. 93), whereas most of the South American species have the eighth segment long and slender (Fig. 91).

A smaller group of Old World species, in which the tube is not constricted apically (Mound, 1974*b*: 136 – key couplet 2 plus *acutulus*) (Fig. 88), may also constitute a holophyletic group, although no generic name has ever been proposed for it. However, the six remaining species (*curvidens, fuscatus, mauli, tenuipennis, turbinatus* and *xosa*) seem to be less closely related, but although four generic names are available they are here placed in synonymy until such time as the Old World fauna is more fully investigated. *Pharetrothrips* was erected for a species with long preocellar setae, and a long curved apical tubercle on the foretibiae; antennal segment VIII of this species is narrowed basally, whereas in *fuscatus* (which also has a foretibial tubercle) segments VII–VIII are broadly joined. *Percnothrips*, like *Syncerothrips*, was erected for a species with antennal segments VII–VIII almost completely fused (Fig. 93) but with a pair of long preocellar setae (Fig. 126). *Paragastrothrips* includes a single species which is similar to several *Gastrothrips* species but with a long head, broad pelta and short antennal segment VIII. Finally, *Isopterothrips* includes a single large species with long postocellar setae, a fan of stout spines on the forecoxae in males, and a slender eighth antennal segment. The species *xosa*, known from a single female, is very similar to *tenuipennis* but smaller.

All of the species listed below as examined have well-developed metathoracic sternopleural sutures (Fig. 128), three sense cones on antennal segment IV and two (or one) on segment III (Figs 92, 93), and only the three species noted above have long ocellar setae. In most New World species antennal segment VIII is long and slender, but it is broadly joined to VII in most Old World species.

Species included

abditus Hood, 1935*b*: 177–82. Holotype ♀, Panama (USNM).
  brasiliensis Moulton, 1938: 378–9 (*Hoplothrips*). Holotype ♀, Brazil (CAS).
  hambletoni Moulton, 1941: 320–1 (*Probolothrips*). Holotype ♀, Brazil (CAS).
acuticornis (Hood, 1925*b*: 65) (*Cryptothrips*). Holotype ♀, West Indies: St. Croix (USNM).
  cybele Girault, 1927*d*: 1 (*Cryptothrips*). Holotype ♂, Australia: Queensland (QMB).
  noumeae Bianchi, 1945: 251–4. Holotype ♀, New Caledonia (BPBM).
acutulus Okajima, 1979*c*: 511–3. Holotype ♀, Japan (OCT).
alticola Hood, 1942: 570–3. Holotype ♀, Peru (USNM).
anolis Morgan, 1925: 7–8. Holotype ♀, Puerto Rico (USNM).
  proteus Hood, 1933: 417–9. Holotype ♀, Panama (USNM).
callipus Hood, 1935*b*: 182–6. Holotype ♀, U.S.A.: Texas (USNM).
***citriceps** (Priesner, 1921: 208–9) (*Cryptothrips*). Holotype ♀, Paraguay (ZMB).
corvus Priesner, 1933: 55–7. Holotype ♀, Mexico (SMF).
  capitalis Hood, 1935*b*: 174–7. Holotype ♀, U.S.A.: Texas (USNM).
curvidens (Karny, 1921*c*: 38–41) (*Agnostochthona*). Holotype ♀, Java (SMF). **Comb. n.**
falcatus (Ananthakrishnan, 1968*c*: 969–71) (*Nesothrips*). Syntypes ♀ ♂, India (TNA).
fulvicauda Hood, 1937*a*: 277–80. Holotype ♀, Peru (USNM).

fulviceps Hood, 1937*a*: 274–7. Holotype ♀, PERU (USNM).
fumipennis Hood, 1952*c*: 163. Holotype ♀, BRAZIL (USNM).
fuscatus Okajima, 1979*c*: 513–5. Holotype ♀, TAIWAN (OCT).
harti (Hood, 1935*b*: 192–4) (*Syncerothrips*). Holotype ♀, U.S.A.: Texas (USNM). **Comb. n.**
****heterocerus*** (Hood, 1925*b*: 66) (*Barythrips*). Syntypes ♀ ♂, WEST INDIES: St. Thomas (USNM). [Jacot-Guillarmod, 1978: 1427 states 'Should be placed in *Neosmerinthothrips*'.]
intonsus Hood, 1941: 180–3. Holotype ♀, PERU (USNM).
mandiocae (Moulton, 1941: 321–2) (*Dichaetothrips*). Holotype ♀, BRAZIL (CAS).
  **oeceticola* De Santis, 1943: 92–6. Holotype ♀, ARGENTINA (MLPA).
mauli (Zur Strassen, 1977: 60–63) (*Paragastrothrips*). Holotype ♀, MADEIRA (SMF). **Comb. n.**
mongolicus (Pelikan, 1965: 231–3) (*Nesothrips*). Holotype ♀, MONGOLIA (TM).
monticola Hood, 1942: 573–6. Holotype ♀, PERU (USNM).
procerus Hood, 1956: 99–100. Holotype ♀, BRAZIL (USNM).
proturus (Bagnall, 1921*a*: 269–70) (*Acallurothrips*). Holotype ♀, SEYCHELLES (BMNH). **Comb. n.**
****pueblae*** Johansen, 1979: 179–80. Holotype ♀, MEXICO (UNAM).
ruficauda Hood, 1912*c*: 156–7. Syntypes ♀, U.S.A.: Illinois (USNM).
stygicus Hood, 1935*b*: 186–91. Holotype ♀, PANAMA (USNM).
subulatus (Hartwig, 1948: 113–5) (*Bolothrips*). Holotype ♀, SOUTH AFRICA (NCIP).
tenuipennis (Bagnall, 1926: 554) (*Isopterothrips*). Holotype ♀, GHANA (BMNH). **Comb. n.**
  penicillatus Priesner, 1937*b*: 626–9 (*Dichaetothrips*). Holotype ♀, SIERRA LEONE (BMNH).
terrestris (Priesner, 1925*c*: 316–7) (*Goetothrips*). Syntypes ♀ ♂, MEXICO (SMF). **Comb. n.**
  **gurdus* Johansen, 1974: 266 (*Nesothrips*). Holotype ♀, MEXICO (UNAM).
texanus Hood, 1912: 157–9. Holotype ♀, U.S.A.: Texas (USNM).
turbinatus (Ananthakrishnan, 1967: 233–4) (*Percnothrips*). Holotype ♀, INDIA (TNA). **Comb. n.**
xosa (Jacot-Guillarmod, 1939*b*: 43–6) (*Dichaetothrips*). Holotype ♀, SOUTH AFRICA (AMG). **Comb. n.**

Genera of Diceratothripina

Karny (1925*c*) erected this group as a subfamily for 11 genera, including some now placed in the Phlaeothripinae. Priesner (1961) used it as a subtribe of his Cryptothripini, but included a wide range of genera whose main common characteristic was the large body size of most species. The present reclassification derives largely from recognition of the phylogenetic significance of the presence of metathoracic sternopleural sutures. The Diceratothripina is thus defined as those Pygothripini which possess these sutures (with a few exceptions) as well as four sense cones on antennal segment IV and widely spaced (usually V-shaped) maxillary stylets. The group is large and diverse, and represented in all parts of the tropics and subtropics. However, the *Nesothrips*-group (*Campulothrips, Carientothrips, Nesidiothrips* and *Nesothrips + Rhaebothrips*) is found mainly in the Australian and Pacific regions. This genus-group probably shared an ancestor with *Acallurothrips* and *Neosmerinthothrips,* but species of these two pantropical genera exhibit a tendency for the tube to be swollen or at least to have convex margins. This is also found in *Phacothrips* and the new species of *Diceratothrips* described below; these two genera, together with *Sporothrips*, constitute the New World element in the Diceratothripina. Two genera described from Africa, *Elgonima* and *Pseudoeurhynchothrips*, are each based on a single damaged individual on which a full range of characters is not visible. *Pseudoeurhynchothrips* has a large foretarsal tooth in the female, as in *Neosmerinthothrips*-group but unlike *Nesothrips*-group, and the straight-sided tube of the only known specimen probably represents a reversion from the convex form found in *Neosmerinthothrips* species.

ACALLUROTHRIPS Bagnall

(Figs 145, 146, 161, 168, 179, 180)

Acallurothrips Bagnall, 1921*a*: 269. Type-species: *Acallurothrips macrurus* Bagnall, by original designation.
Diopsothrips Hood, 1934: 422–3. Type-species: *Diopsothrips flavus* Hood, by original designation. **Syn. n.**

This genus was erected for two species from the Seychelles, each of which was known only from a single damaged specimen (Mound, 1968). Moulton described a third species, *latus* from Fiji, but

the genus has never been redefined. However, one of Bagnall's species, *proturus*, is here transferred to *Gastrothrips*, and *macrurus* and *latus* are recognised as being closely related to *spinicauda* Priesner together with several other species originally described in *Pygothrips*. *Acallurothrips*, which differs from *Pygothrips* in head shape and stylet position, may be defined as follows.

Head broad, maxillary stylets wide apart (Figs 145, 146). Antennae with segments VII–VIII broadly joined (rarely fused); sense cones usually arising laterally, 2 on III, 4 on IV, sometimes long and curved in large species (Fig. 168). Epimeral sutures usually complete. Praepectus present (Fig. 145); mesopraesternum often eroded; metathoracic sternopleural sutures present, but area posterior to mesocoxae as well as anapleural suture and anterior border of anepisternum often eroded into chitinous islets. Foretarsal tooth present in both sexes. Forewing without duplicated cilia (except *breviceps*); sub-basal seta B_3 long. Metanotum weakly reticulate, median setae long and widely spaced. Pelta broadly reticulate, frequently eroded at posterior margin (Figs 179, 180); median sternites usually longer than tergites. Wing-retaining setae usually weak; tube greatly expanded with margins convex, often ridged near base, apex constricted (Fig. 161).

Fifteen species (including two from *Diopsothrips* and one from *Lathrobiothrips*) have been studied and found to agree with the above definition, and a further species is referred to this genus from *Diopsothrips* on the basis of its original description. A short series of specimens of *metulicauda*, collected in Malaya and Java, suggests that the size and colour of the tube are variable in this species at least. Moreover, antennal segment IV usually bears four sense cones, but individuals have been studied with only two, or even with two on one antenna and four on the other. Contrary to Mound (1968), the damaged holotype of *macrurus* has four sense cones on antennal segment IV. Unfortunately, many of the described species have only been collected once, and so little information is available on intraspecific variation in this genus.

Most *Acallurothrips* species have antennal segments VII–VIII broadly joined, but these segments are fused without trace of a suture in *flavus* (Fig. 168) and *louisianae* (also *brunneus*?). This difference is not accepted as a basis for recognising *Diopsothrips* as a useful genus. The pronotal epimeral sutures are complete in *flavus* but incomplete in the closely similar species *louisianae*. Hood compared *Diopsothrips* to *Symphyothrips* in his original description, and this led Stannard (1957) to place the genus in synonymy with *Polyphemothrips*.

Most of the species listed below in *Acallurothrips* are small in size. However, *quadraticeps* is large, with the head almost as long as wide, the stylets only one-third of the head width apart, and the sense cones on antennal segments III–IV not lateral in origin. This species resembles *Phacothrips ocelloides* in general appearance. *Acallurothrips* is probably most closely related to *Neosmerinthothrips* (q.v.) in which the species usually have the tube margins slightly convex. *Pygothrips* is here regarded as being more distantly related, despite the many similarities in tube and abdomen, because of the long closely approximated maxillary stylets. Faure described *judithae* in *Lathrobiothrips* because of the enlarged tube, but that genus is here placed in the Phlaeothripinae – Docessissophothripini as a synonym of *Holothrips*.

SPECIES INCLUDED

amplus (Faure, 1949*c*: 118–22) (*Pygothrips*). Holotype ♀, SOUTH AFRICA (NCIP). **Comb. n.**
badius (Faure, 1955: 35–40) (*Pygothrips*). Holotype ♀, SOUTH AFRICA (NCIP). **Comb. n.**
breviceps (Hood, 1934: 419–20) (*Pygothrips*). Holotype ♀, PANAMA (USNM). **Comb. n.**
***brunneus** (Hood, 1934: 424–5) (*Diopsothrips*). Lectotype ♀, PANAMA (USNM). **Comb. n.**
conifer (Hood, 1925*b*: 67) (*Pygothrips*). Holotype ♀, TRINIDAD (USNM). **Comb. n.**
fasciolatus (Hood, 1952*c*: 165–6) (*Pygothrips*). Holotype ♀, BRAZIL (USNM). **Comb. n.**
flavus (Hood, 1934: 423–4) (*Diopsothrips*). Lectotype ♀, PANAMA (USNM). **Comb. n.**
judithae (Faure, 1956: 321–30) (*Lathrobiothrips*). Holotype ♀, SOUTH AFRICA (NCIP). **Comb. n.**
latus Moulton, 1944: 289–90. Holotype ♀, FIJI (BPBM).
louisianae (Hood, 1936*a*: 98–100) (*Diopsothrips*). Holotype ♀, U.S.A.: Louisiana (USNM). **Comb. n.**
macrurus Bagnall, 1921*a*: 270–1. Holotype ♀, SEYCHELLES (BMNH).
mamillicauda (Hood, 1954*c*: 208–10) (*Pygothrips*). Holotype ♀, TRINIDAD (USNM). **Comb. n.**
metulicauda (Karny, 1923: 336–40) (*Pygothrips*). Syntypes ?♀, JAVA (SMF). **Comb. n.**
noguttii (Kurosawa, 1932: 234–8) (*Pygothrips*). Holotype ♀, JAPAN (?NIAT). **Comb. n.**

quadraticeps (Hood, 1952*c*: 166) (*Pygothrips*). Holotype ♀, Brazil (USNM). **Comb. n.**
spinicauda (Priesner, 1939*b*: 57–9) (*Pygothrips*). Holotype ♀, Congo (SMF). **Comb. n.**

CAMPULOTHRIPS Moulton

(Figs 133, 148, 151, 162)

Campulothrips Moulton, 1944: 310–1. Type-species: *Campulothrips gracilis* Moulton, by monotypy.

This genus has previously been considered to be related to the Idolothripini, but this is not accepted here because of the presence of short metathoracic sternopleural sutures (Fig. 151) and a single pair of wing-retaining setae on each tergite. These characters, together with the large pair of setae between the posterior ocelli (Fig. 133) and the enlarged L-shaped femora of males (Fig. 148), suggest that the genus is derived from *Nesothrips*, within whose zoogeographic range (the Pacific) it occurs. However, the elongate antennae, long median setae on the metanotum, tube with prominent lateral setae at least in the basal half (Fig. 162) and rather swollen katepimera (albeit with complete anapleural sutures) are remarkable examples of convergent evolution toward the typical body form of some South American Idolothripini.

Species included
gracilis Moulton, 1944: 311. Holotype ♀, Fiji (BPBM).

CARIENTOTHRIPS Moulton

(Figs 135–137, 164, 181–185)

Bolothrips (*Carientothrips*) Moulton, 1944: 306. Type-species: *Bolothrips* (*Carientothrips*) *fijiensis* Moulton, by monotypy.

This group was first recognised as a full genus by Mound (1974*a*) who defined it and discussed the generic relationships together with a key to 17 species (1974*b*). These species are found mainly in the Australian and Pacific regions, although *denticulatus* is known only from Tierra del Fuego and the Falkland Islands. In general appearance several species resemble *Bolothrips* species, the body being slender, pelta broad (Figs 181–185) and eyes prolonged ventrally (Fig. 137), but this is probably due to convergent evolution through adaption to a similar habitat at the base of grasses. The species found on dead branches tend to be less slender and in macropterae the pelta has distinctive broad lateral wings (Fig. 183). The metathoracic sternopleural sutures in most species of *Carientothrips* are clearly defined, but in a few species are narrow and difficult to see, and in *badius* are not developed at all. The genus appears to represent an holophyletic species-group derived from *Nesothrips*, or it may represent the sister-group of that genus. Individual species of these two groups are frequently difficult to place in a genus.

Species included
acti Mound, 1974*a*: 25–6. Holotype ♀, Australia (ANIC).
badius (Hood, 1918*b*: 143–4) (*Cryptothrips*). Holotype ♀, Australia (USNM).
  apterus Girault, 1928*b*: 2 (*Elaphrothrips*). Holotype ♂, Australia (QMB).
biformis (Moulton, 1939: 146–7) (*Bolothrips*). Holotype ♀, Tahiti (BPBM).
capricornis (Mound, 1974*a*: 23–4) (*Bolothrips*). Holotype ♀, Australia (ANIC).
casuarinae Mound, 1974*a*: 26–9. Holotype ♀, Australia (ANIC).
denticulatus (De Santis, 1963*b*: 66) (*Nesothrips*). Holotype ♀, Argentina (MLPA).
fijiensis (Moulton, 1944: 306–7) (*Bolothrips*). Holotype ♀, Fiji (BPBM).
grayi Mound, 1974*b*: 129. Holotype ♀, New Guinea (BMNH).
japonicus (Bagnall, 1921*b*: 355–6) (*Cryptothrips*). Holotype ♀, Japan (BMNH).
loisthus Mound, 1974*a*: 29–30. Holotype ♀, Australia (ANIC).
magnetis Mound, 1974*a*: 30–1. Holotype ♀, Australia (ANIC).
miskoi Mound, 1974*a*: 31. Holotype ♀, Australia (ANIC).
mjobergi (Karny, 1920*c*: 42) (*Cryptothrips*). Holotype ♀, Australia (NRS).
  incisus Girault, 1927*c*: 1 (*Cryptothrips*). Syntypes ♀, Australia (QMB).
  australicus Priesner, 1928*b*: 649–51 (*Cryptothrips*). Holotype ♀, Australia (SMF).
  flavitibia Moulton, 1968: 117–8 (*Bolothrips*). Holotype ♀, Australia (CAS).

pedicillus Mound, 1974*a*: 32–3. Holotype ♀, AUSTRALIA (ANIC).
pictilis Mound, 1974*a*: 33–4. Holotype ♀, AUSTRALIA (ANIC).
reedi Mound, 1974*a*: 34–5. Holotype ♀, AUSTRALIA (ANIC).
semirufus (Girault, 1928*b*: 4) (*Elaphrothrips*). Holotype ♀, AUSTRALIA (QMB).
vesper Mound, 1974*a*: 35–6. Holotype ♀, AUSTRALIA (ANIC).

DICERATOTHRIPS Bagnall

(Figs 35, 130, 131, 149, 152, 163, 165, 171)

Diceratothrips Bagnall, 1908*b*: 193. Type-species: *Diceratothrips bicornis* Bagnall, by monotypy.
Eulophothrips Schmutz, 1909: 278. Type-species: *Eulophothrips robustus* Schmutz, by monotypy. [Synonymised by Priesner, 1949: 129.]
Megalomerothrips Watson, 1919: 99. Type-species: *Megalomerothrips eupatorii* Watson, by monotypy. [Synonymised by Priesner, 1949: 136–7.]
Diceratothrips (*Endacnothrips*) Priesner, 1933*c*: 147–9. Type-species: *Diceratothrips* (*Endacnothrips*) *horridus* Priesner, by monotypy.

This genus has been subject to much confusion. Mound (1968), following Stannard (1957), treated *Diceratothrips* as a senior synonym of *Dichaetothrips* and also included the *Ethirothrips*-group of species from the Old World. At that time, however, Mound (and probably Stannard) had not examined the type-species of *Dichaetothrips*. Subsequently, it has been realised that *Diceratothrips* is a genus of Neotropical species which can be distinguished from similar-looking Old World species by the presence of long, well-developed sternopleural sutures on the metathorax (Fig. 152). Males, but not females, of all species of *Diceratothrips* examined in this study have a stridulatory file on the external margin of the forecoxae, and the flattened edge of the forefemora apparently functions as a plectrum (Fig. 149). The members of this genus share the following characteristics.

Usually large, black to dark brown species; head often with anteocellar setae long or stout, and cheeks with stout setae; stylets wide apart (Figs 130, 131). Antennae 8-segmented, III relatively long, VII–VIII distinct but sometimes forming a single unit (Fig. 165); III with 2 sense cones, IV with 4 sense cones; IV–VI prolonged ventrally. Pronotum broad and flat, scarcely thickened at anterior or medially; reticulate in anterior third; am, aa and ml setae small (Fig. 131). Praepectus present, mesopraesternum with posterolateral corners almost forming a right-angle; metathoracic sternopleural sutures well-developed (Fig. 152). Forefemora often with stout spines on inner surface in both sexes; foretarsal tooth large or very reduced; forewings broad, with numerous duplicated cilia. Pelta not exceptionally broad, curving away from tergite II laterally (Figs 35, 171); tergites each with one pair of wing-retaining setae.

In contrast to the Old World *Ethirothrips* group of species, allometric growth patterns are found commonly in *Diceratothrips* species. Therefore, since many of these species have been described from few specimens and, moreover, have never been compared directly with their congeners, a number of synonyms can be expected. For example, Hood (1934: 70) in describing a new species *princeps*, listed several characteristics of four species, *armatus, bicornis, persimilis* and *robustus*, none of which he personally had ever examined. Many of the details he gives are incorrect, and the first three of these names are here treated as synonymous. Moreover, *princeps* is almost certainly the same species, *robustus* and *cornutus* are possibly only variants with exceptionally long anteocellar setae, and even *inferorum* may also be the same but with antennal segment III slightly paler. Material identified as *bicornis* has been examined from the following countries: Trinidad, Venezuela, Brazil, Peru and Mexico (in BMNH). Moreover, the unique holotype of *williamsi* Karny from Guatemala has been studied and is here regarded as the same species as *bicornis*. Contrary to the original description and illustration of *williamsi*, the stout ocellar setae arise anterolateral to the ocellar triangle, not behind the posterior ocelli in this holotype.

Not only does *bicornis* exhibit considerable allometric variation in both sexes, it also shows marked sexual dimorphism in the shape of the head and forefemora. Most of the other species of *Diceratothrips*, in both sexes, resemble the females of *bicornis* rather than the males. Moreover, several species have the anteocellar and cheek setae reduced in size, e.g. *delicatus, harti, setigenis* and *validipennis*. Of these, only *delicatus* has stout setae on the inner surface of the

forefemora, whereas the other species have the femora long and broad. The two species *setigenis* and *pallidior*, described from the coast of the Gulf of Mexico, may represent one variable species. The new species *bennetti*, described below from Trinidad, is exceptionally small and *Pygothrips*-like, with the tube swollen, antennal projections reduced, forefemora short and swollen without stout setae on the inner surface, and head short and broad with two pairs of stout cheek setae. Similarly, *nigricauda* which was described in *Pygothrips* has the tube enlarged, the stylets about one-third of the head width apart, the forewing with seven duplicated cilia, pelta not eroded (Fig. 35), and the forecoxae with transverse striations.

SPECIES INCLUDED

**anahuacensis* Johansen, 1976: 59–61. Holotype ♀, MEXICO (UNAM).
bennetti sp. n. Holotype ♂, TRINIDAD (BMNH).
bicornis Bagnall, 1908*b*: 194–5. Holotype ♀, BRAZIL (BMNH).
  armatus Bagnall, 1910*a*: 385–6. Syntypes ♀ ♂, VENEZUELA (BMNH). **Syn. n.**
  williamsi Karny, 1920*a*: 92–4 (*Dichaetothrips*). Holotype ♀, GUATEMALA (DEI). **Syn. n.**
  persimilis Priesner, 1925*b*: 25–6. Holotype ♀, SURINAM (SMF). **Syn. n.**
****cornutus*** Hood, 1952*c*: 156–7. Holotype ♀, BRAZIL (USNM).
****cubensis*** Hood, 1941: 178–80. Lectotype ♀, CUBA (USNM).
delicatus Hood, 1941: 171–4. Holotype ♀, U.S.A.: Florida (USNM).
harti Hood, 1912*a*: 12–4. Holotype ♂, U.S.A.: Texas (USNM).
  **eupatorii* Watson, 1919: 99–100 (*Megalomerothrips*). Holotype ♀, U.S.A.: Florida (FDA).
****hercules*** Johansen, 1977*b*: 59–61. Holotype ♂, MEXICO (UNAM).
horridus Priesner, 1933*c*: 147–9. Holotype ♂, MEXICO (SMF).
inferorum (Priesner, 1933*a*: 62–3) (*Adiaphorothrips*). Holotype ♀ (not ♂), MEXICO (SMF).
****longipes*** Hood, 1912*a*: 14–5. Holotype ♂, U.S.A.: Texas (USNM).
nigricauda (Hood, 1925*b*: 67–8) (*Pygothrips*). Holotype ♀, TRINIDAD (USNM). **Comb. n.**
****obscuricornis*** Hood, 1941: 174–6. Holotype ♀, CUBA (USNM).
pallidior Priesner, 1933*c*: 151. Holotype ♀, MEXICO (SMF).
picticornis Hood, 1914: 166–7. Holotype ♀, PANAMA (USNM).
  **wolcotti* Morgan, 1925: 8–9. Holotype ♀, PUERTO RICO (USNM).
princeps Hood, 1934: 68–71. Holotype ♂, PANAMA (USNM).
****robustus*** (Schmutz, 1909: 278–81) (*Eulophothrips*). Holotype ♂, BRAZIL (? lost).
****sakimurai*** Johansen, 1977*b*: 61–2. Holotype ♀, MEXICO (UNAM).
setigenis Hood, 1941: 176–8. Lectotype ♀, U.S.A.: Texas (USNM).
****timidus*** Johansen, 1976: 61–2. Holotype ♀, MEXICO (UNAM).
validipennis (Hood, 1938*c*: 403–6) (*Gastrothrips*). Holotype ♀, U.S.A.: Florida (USNM).

Diceratothrips bennetti sp. n.

(Figs 131, 152, 163, 165, 171)

Macropterous ♂. Colour dark brown, tube black; distal half of antennal segment II, and segment III except at apex, brownish yellow; major setae dark brown; wings shaded particularly at base and apex, but with no longitudinal line.

Head short and broad with two pairs of cheek setae (Fig. 131); anteocellar setae short. Antennae with sense cones on III very short (Fig. 165). Forefemora swollen on inner surface but with no stout setae, posterior angle acute and extending to striate area on forecoxae; foretarsal tooth almost as long as tarsal width. Forewing sub-basal seta B_2 arising posterolateral to B_1. Pelta broadly triangular (Fig. 171); tergites II–VI each with one pair of wing-retaining setae; median sternites slightly longer than tergites; postero-lateral abdominal setae long and stout; tube stoutly conical.

Measurements (holotype ♂ in μm). Body length 2350. Head, length 285 (tilted); width 220; postocular setae 105. Pronotum, length 150; width 300; major setae – am 15, aa 15, ml 15, epim 110/15, pa 25. Forewing, length 950; width 90; sub-basal setae 40, 60, 100; number of duplicated cilia 18. Tergite IX setae B_1 220; B_2 ?; B_3 220. Tube, length 240; basal width 120; terminal setae 90. Antennal segments III–VIII length 105, 93, 75, 65, 60, 30.

Macropterous ♀. Colour and structure similar to ♂ but larger; forefemora swollen, with posterior angle rounded and not extending to forecoxae; anteocellar setae stout; pronotum not as broad and flat as in most species of this genus, with a weak line of thickening anteromedially.

Measurements (paratype ♀ in μm). Body length 2750. Head, length 270; width 255; postocular setae

140. Pronotum, length 165; width 350; major setae – am 18, aa 18, ml ?15, epim 150, pa 45. Metanotal median setae 45. Forewing, length 1100; distal width 120; sub-basal setae 40, 60, 120; number of duplicated cilia 22. Tergite IX setae B_1 ?; B_2 ?; B_3 240. Tube, length 255; basal width 140; terminal setae 90. Antennal segments III–VIII length, 115, 100, 80, 70, 70, 30.

SPECIMENS STUDIED

Holotype ♂, **Trinidad**: Curepe, on grasses, 8.xi.1970 (*L. A. Mound* 921) (BMNH).
Paratype. 1 ♀ collected with holotype (BMNH).

COMMENTS. This new species was collected whilst studying at the headquarters of the Commonwealth Institute of Biological Control at the invitation of the Director, Dr Fred Bennett. Only two specimens were found, and these were in rough grassland. However, the structural adaptations of *bennetti* are such as might be expected of a species of *Diceratothrips* adapted to grass-living rather than the typical habitat of dead branches. The sternites are relatively long, the posterior abdominal setae stout, and the tube enlarged, all of which suggest that the species raises the tube over the head in life, as do species of *Acallurothrips* and *Pygothrips*, as well as *Nesothrips propinquus*.

ELGONIMA Zur Strassen

Elgonima Zur Strassen, 1972: 91. Type-species: *Elgonima seticeps* Zur Strassen, by monotypy.

This genus is based on a single, imperfect, macropterous female. Due to contraction of the pterothorax it is impossible to determine the presence or absence of metathoracic sternopleural sutures. However, *seticeps* is apparently typical of the Diceratothripina. Antennal segment VIII is slender, but the sense cones on III–IV are unusually long for species in diceratothripine genera. The pronotal epimeral sutures are incomplete, and all the major setae have expanded apices, including those on tergite IX and one pair of postocellars. The relationships of *Elgonima* cannot be determined with certainty at present.

SPECIES INCLUDED

seticeps Zur Strassen, 1972: 91–3. Holotype ♀, KENYA (NRS).

NEOSMERINTHOTHRIPS Schmutz

(Figs 132, 138, 139, 153–156, 169, 172, 173)

Neosmerinthothrips Schmutz, 1913: 1051. Type-species: *Neosmerinthothrips fructuum* Schmutz, by monotypy.

Coenurothrips Bagnall, 1921*a*: 271. Type-species: *Coenurothrips brevicollis* Bagnall, by original designation. [Synonymised by Mound, 1974*b*: 148.]

Galactothrips Moulton, 1933*a*: 404. Type-species: *Galactothrips diversicolor* Moulton, by monotypy. [Synonymised by Mound, 1974*b*: 148.]

This genus was redefined and discussed by Mound (1974*b*) with a key to 18 species. These comprise a small New World species-group, and a larger and more diverse Old World species-group. However, the genus is distinguished with difficulty from the equally widespread tropical genus *Acallurothrips*. Members of the latter genus have the tube more strongly swollen, antennal segments VII–VIII broadly joined or fused, and the body sclerites frequently reduced. Thus future research may indicate that neither of these genera represent holophyletic groupings. *Pseudoeurhynchothrips bidens* is similar to some *Neosmerinthothrips* but has the tube long with straight margins. The poorly preserved syntypes of *Barythrips grandicauda* have been examined and are here interpreted as the only known micropterous species of *Neosmerinthothrips*. However, they are similar to *Acallurothrips* species in having the setae on tergite IX scarcely half as long as the tube, the pelta reduced and eroded medially on the posterior margin, and the metanotum transverse with a pair of long setae. These two syntypes were probably collected in the Oriental Region, the name 'Frauenfeld' on the slide almost certainly refers to the well-known entomologist who worked in southern Europe. In some *Neosmerinthothrips* the postocellar setae are elongate; in *nigrisetis* they are as long as the sides of the ocellar triangle, but in the new species *hamiltoni* described below they are even longer (Fig. 132).

Species included

affinis (Bagnall, 1921*b*: 361–2) (*Coenurothrips*). Holotype ♀, Sri Lanka (BMNH).
annulipes (Hood, 1950: 13–6) (*Gastrothrips*). Holotype ♀, Brazil (USNM).
milleforme De Santis, 1963*a*: 12–4 (*Nesothrips*). Holotype ♀, Argentina (MLPA).
brevicollis (Bagnall, 1921*a*: 271–2) (*Coenurothrips*). Syntypes ♂ ♀, Seychelles (BMNH).
collaris (Bagnall, 1917: 26–7) (*Cryptothrips*). Lectotype ♀, St Vincent (BMNH).
fuscicauda Morgan, 1925: 6–7 (*Gastrothrips*). Holotype ♂, Puerto Rico (USNM).
marshalli Priesner, 1934: 58–60 (*Bolothrips*). Lectotype ♀, Sierra Leone (BMNH).
dominicanus Hood, 1935*b*: 170–4 (*Gastrothrips*). Holotype ♂, Dominican Republic (USNM).
diversicolor (Moulton, 1933*a*: 404–6) (*Galactothrips*). Holotype ♀, Brazil (CAS).
fijiensis (Moulton, 1944: 286–7) (*Gastrothrips*). Holotype ♀, Fiji (BPBM).
fructuum Schmutz, 1913: 1052–3. Lectotype ♂, Sri Lanka (Ceylon) (SMF).
ceylonicus Karny, 1925*c*: 137–9 (*Oedemothrips*). Holotype ♀, Sri Lanka (BMNH).
grandicauda (Priesner, 1925*b*: 21) (*Barythrips*). Syntypes ♂ ♀, ?Oriental Region (SMF). **Comb. n.**
hamiltoni sp. n. Holotype ♀, Brazil (BMNH).
hilaris (Priesner, 1937*b*: 624–6) (*Bolothrips*). Holotype ♂, Sierra Leone (BMNH).
hoodi (Faure, 1954*a*: 9–13) (*Gastrothrips*). Holotype ♀, South Africa (NCIP).
****inquilinus*** Ananthakrishnan, 1960: 32–3. Holotype ♀, India (?TNA).
nigrisetis (Hood, 1935*b*: 161–5) (*Gastrothrips*). Holotype ♀, Panama (USNM).
parvidens (Hood, 1935*b*: 165–8) (*Gastrothrips*). Holotype ♀, Panama (USNM).
paulistarum (Hood, 1950: 25–7) (*Gastrothrips*). Holotype ♀, Brazil (USNM).
picticornis (Hood, 1936*c*: 272–5) (*Gastrothrips*). Holotype ♀, Brazil (USNM).
plaumanni (Hood, 1950: 20–2) (*Gastrothrips*). Holotype ♀, Brazil (USNM).
robustus (Ananthakrishnan, 1964*a*: 102–3) (*Nesothrips*). Syntypes ♂ ♀, India (TNA).
variipes (Hood, 1950: 16–20) (*Gastrothrips*). Holotype ♀, Brazil (USNM).
xylebori Priesner, 1935*c*: 370. Lectotype ♀, Java (SMF).

Neosmerinthothrips hamiltoni sp. n.

(Figs 132, 154, 169, 172)

Macropterous ♀. Colour dark brown, head and tube black; antennal segment III yellow with apical third light brown, IV yellowish brown in basal half, V slightly paler at base than apex, II yellow apically; major setae dark brown; forewing clear except around sub-basal setae.

Head slightly narrowed to base, weakly sculptured laterally (Fig. 132); postocellar setae extending to apex of antennal segment II; maxillary stylets wide apart, retracted to postocular setae; mouth cone broadly rounded. Antennal segment III slender with two sense cones; IV with four sense cones; VIII slightly narrowed to base (Fig. 169). Pronotum transverse, epimeral sutures complete (Fig. 132); anteromarginal setae short; praepectus present, mesopraesternum broadly boat-shaped. Foretarsal tooth slender, two-thirds as long as tarsal width. Mesonotal lateral setae very small. Metanotum scarcely sculptured medially. Anapleural sutures complete, katepisternum eroded anteriorly; metathoracic sternopleural sutures long. Forewing broad, sub-basal setae arising close together in a straight line. Pelta with short broad lateral wings (Fig. 172). Tergites II–VII with one pair of wing-retaining setae, sigmoid on III–VI; setae on IX elongate; tube with slightly sinuate, convex margins (Fig. 154). Sternites with about 12 rather weak discal setae.

Measurements (holotype ♀ in μm). Body length 3400. Head, length 360; width behind eyes 275; postocellar setae 190; postocular setae 240. Pronotum, length 150; width 360; major setae – am 25, aa 60, ml 135/165, epim 225, pa 195. Metanotal median setae 30. Forewing, length 1300; distal width 150; sub-basal setae 30, 150, 180; number of duplicated cilia 20. Tergite IX setae B_1 360, B_2 420. Tube, length 345; basal width 120; terminal setae 270. Antennal segments III–VIII length, 135, 120, 100, 75, 50, 40.

Macropterous ♂. Colour and structure similar to ♀ but smaller, body length 2500, head length 270; postocellar setae 160.

Specimens studied

Holotype ♀, **Brazil**: S.P., Ribeirao Preto, FFCLRP Campus, in hollow twig of *Glyricidia*, 7.ix.1975 (*W. D. Hamilton*) (BMNH).

Paratypes. 9 ♀, 2 ♂ collected with holotype (BMNH).

Comments. This belongs to the South American species-group of *Neosmerinthothrips* which includes *nigrisetis* and *variipes*, but is readily distinguished by its larger size with more slender

antennae and tube, and the remarkably long postocellar setae. This new species was at first considered to represent a *Dichaetothrips*, but the presence of metathoracic sternopleural sutures as well as the structure of the pelta and short antennal sense cones indicate that it belongs in *Neosmerinthothrips*.

NESIDIOTHRIPS Mound

(Figs 134, 157, 174)

Nesidiothrips Mound, 1974*b*: 156–7. Type-species: *Nesothrips alius* Ananthakrishnan, by original designation.

This genus was erected for two species which have most characters similar to those of *Nesothrips* species, but with a pair of stout setae within the ocellar triangle (Fig. 134) and the females with a large foretarsal tooth.

SPECIES INCLUDED
alius (Ananthakrishnan, 1970: 52–5) (*Nesothrips*). Holotype ♀, INDIA (TNA).
validus (Bagnall, 1921*a*: 272–3) (*Coenurothrips*). Holotype ♀, SEYCHELLES (BMNH).

NESOTHRIPS Kirkaldy

(Figs 142–144, 159, 160, 167, 175–178)

Nesothrips Kirkaldy, 1907: 103. Type-species: *Nesothrips oahuensis* Kirkaldy, by monotypy.
Oedemothrips Bagnall, 1910*b*: 680. Type-species: *Oedemothrips laticeps* Bagnall, by monotypy. [Synonymised by Bianchi, 1944.]
Rhaebothrips Karny, 1913*c*: 128. Type-species: *Rhaebothrips lativentris* Karny, by monotypy. **Syn. n.**

Mound (1974*b*) discussed the relationship between *Nesothrips* and *Rhaebothrips* and gave keys to the world species of these two genera. At that time they were distinguished on the basis of the relatively short tube in *Nesothrips* and the relatively long and closely approximated ocellar setae in *Rhaebothrips*, but it was predicted that further studies on the Pacific fauna would erode these small differences. The new species described below from New Zealand further reduces the distance between the two groups and so they are here treated as one genus.

The type-species of *Rhaebothrips* is now found in most parts of the tropics, associated with coconut fronds and fruits, but it is almost certainly native to the Pacific area. This species, *lativentris*, is variable and has eight junior synonyms; like *nigrisetis* to which it is closely related, it has a relatively slender head and pale antennal segment III. A further Pacific species, *major*, is larger with dark antennae and even longer, more closely set ocellar setae. None of these species, in common with all the species described in *Nesothrips*, has a foretarsal tooth in the females. In contrast *leveri* from Fiji has a shorter head but long and close-set ocellar setae, and the female bears a foretarsal tooth. Moreover, three species from New Zealand described by Mound (1974*b*) have the head intermediate in length with the ocellar setae relatively far apart and arising between or behind the posterior ocelli (Fig. 144); one of these, *doulli*, has a foretarsal tooth in the female. Finally the new species *rangi*, described below, has the head even broader and more typically *Nesothrips*-like, but has long ocellar setae (Fig. 143). The head shape and length of the ocellar setae already exhibit a wide range in *Nesothrips* species (Figs 142–144).

Almost all the species of *Nesothrips* have well-developed metathoracic sternopleural sutures, although these are not present in *oahuensis* and *melinus* and are highly variable (from well-developed to absent) in *propinquus* (Mound & Walker, 1983). *Carientothrips* (q.v.) is closely related to *Nesothrips* and cannot be distinguished on any single character. *Campulothrips* with one species appears to be a specialised derivative of the *lativentris–major* species-group.

SPECIES INCLUDED
aoristus Mound, 1974*a*: 68. Holotype ♀, AUSTRALIA (ANIC).
artocarpi (Moulton, 1942*b*: 14–5) (*Bolothrips*). Holotype ♀, GUAM (BPBM).
brevicollis (Bagnall, 1914*b*: 29–30) (*Oedemothrips*). Holotype ♀, JAPAN (BMNH).
minor Bagnall, 1921*a*: 287–8 (*Coenurothrips*). Holotype ♀, RODRIGUES (BMNH).

formosensis Priesner, 1935*c*: 368–70 (*Neosmerinthothrips*). Lectotype ♀, Taiwan (SMF).
formosensis var. *karnyi* Priesner, 1935*c*: 369–70. Lectotype ♀, Java (SMF).
carveri Mound, 1974*a*: 71. Holotype ♀, Australia (ANIC).
doulli (Mound, 1974*b*: 171–3) (*Rhaebothrips*). Holotype ♀, New Zealand (BMNH). **Comb. n.**
eastopi (Mound, 1974*b*: 173–4) (*Rhaebothrips*). Holotype ♀, New Zealand (BMNH). **Comb. n.**
fodinae Mound, 1974*b*: 163–4. Holotype ♀, Fiji (BMNH).
hemidiscus Mound, 1974*a*: 71–2. Holotype ♀, Australia (ANIC).
lativentris (Karny, 1913*c*: 129–30) (*Rhaebothrips*). Holotype ♂, Taiwan (? lost). **Comb. n.**
claripennis Hood, 1919*b*: 90 (*Cryptothrips*). Holotype ♀, Australia (USNM).
seychellensis Bagnall, 1921*a*: 274–6 (*Cryptothrips*). Lectotype ♂, Seychelles (BMNH).
difficilis Bagnall, 1921*a*: 276 (*Cryptothrips*). Holotype ♀, Seychelles (BMNH).
magnus Moulton, 1928*c*: 299 (*Cryptothrips*). Holotype ♀, Taiwan (CAS).
yuasai Moulton, 1928*d*: 315 (*Gynaikothrips*). Holotype ♀, Taiwan (CAS).
ipomoeae Ishida, 1932: 12–4 (*Machatothrips*). Holotype ♀, Ponape (Hokkaido Univ.).
fuscus Moulton 1942*b*: 15–6 (*Rhaebothrips*). Holotype ♀, Guam (BPBM).
australiensis Moulton, 1968: 118–9 (*Bolothrips*). Holotype ♀, Lord Howe Is. (CAS).
leveri (Mound, 1974*b*: 175) (*Rhaebothrips*). Holotype ♀, Fiji (BMNH). **Comb. n.**
major (Bagnall, 1928: 75–6) (*Rhaebothrips*). Holotype ♂, Samoa (lost).
malaccae Mound, 1974*b*: 164–6. Holotype ♀, West Malaysia (BMNH).
melinus Mound, 1974*a*: 72–3. Holotype ♀, Australia (ANIC).
niger (Moulton & Steinweden, 1932: 167–8) (*Bolothrips*). Holotype ♀, Marquesas (BPBM).
nigrisetis (Sakimura, 1972: 400–2) (*Rhaebothrips*). Holotype ♂, Fiji (BPBM). **Comb. n.**
oahuensis Kirkaldy, 1907: 103. Syntype ♀, Oahu (? BPBM).
laticeps Bagnall, 1910*b*: 680–1 (*Oedemothrips*). Syntypes ♂ ♀, Oahu (BMNH).
hawaiiensis, lapsus for *oahuensis*, Bianchi, 1944: 31–8.
propinquus (Bagnall, 1916: 408–9) (*Oedemothrips*). Holotype ♀, Australia (BMNH).
dimidiatus Hood, 1918*b*: 145–6 (*Cryptothrips*). Holotype ♀, Australia (USNM).
cestosa Karny, 1920*c*: 41; 1921*b*: 33–6 (*Bagnalliella*). Holotype ♀, Australia (NRS).
propinquus var. *breviceps* Bagnall, 1924: 634–5 (*Oedemothrips*). Syntypes ♀, New Zealand (BMNH).
propinquus f. *obscuricornis* Bagnall, 1924: 634. Types not designated.
oleriae Moulton, 1949: 492–4 (*Neosmerinthothrips*). Holotype ♀, South Africa (CAS).
similis Hartwig, 1948: 103–8 (*Bolothrips*). Holotype ♀, South Africa (NCIP).
rangi sp. n. Holotype ♂, New Zealand (NZAC).
rhizophorae (Girault, 1927: 2) (*Cryptothrips*). Syntypes ♂ ♀, Australia (QMB).
semiflavus (Moulton, 1939: 147–8) (*Bolothrips*). Holotype ♀, Rapa (BPBM).
yanchepi Mound, 1974*a*: 75. Holotype ♀, Australia (ANIC).
zondagi (Mound, 1974*b*: 176–7) (*Rhaebothrips*). Holotype ♀, New Zealand (NZAC). **Comb. n.**

Nesothrips rangi **sp. n.**

(Figs 143, 167, 178)

♀ macroptera. Body dark brown, head and tube darkest; legs dark, extreme apex of femora and base of tibiae yellow, foretibiae yellowish brown, all tarsi paler; antennae variable in colour, III yellow with apex more or less brown, IV yellow in basal half but sometimes light brown, V with pedicel yellow or uniformly brown, I and VI–VIII dark brown, II variably yellow at apex; forewings dark at base, weakly shaded distally; major setae dark brown.

Head almost as wide as long, weakly projecting in front, cheeks rounded, compound eyes not large (Fig. 143); ocelli present but rather small, ocellar setae arising between posterior ocelli and about as long as distance between their bases; postocular setae long and fine; stylets wide apart and retracted halfway into head; mouth cone broadly rounded. Antennae 8-segmented; VIII narrowed to base; VI–VII with constricted pedicels; III with 2 sense cones, IV with 4 sense cones (Fig. 167).

Pronotum transverse, weakly sculptured near posterior margin; all 5 pairs of major setae present but epimerals longest; praepectal plates well developed (Fig. 143); mesopraesternum broadly boat-shaped. Mesonotal lateral setae small. Metanotum not elongate (i.e. not fully macropteroid), median setae slender; sternopleural sutures elongate; anapleural sutures complete. Foretarsi with no tooth. Forewings parallel-sided with 3 sub-basal setae arising almost in a straight line. Pelta broad, rounded medially (Fig. 178); wing-retaining setae present on tergites II–VII, sigmoid only on IV–VI;

anterior tergites with lateral setae short; tergite IX setae more than half as long as tube; tube margins weakly convex in distal third.

Measurements (holotype ♀ in μm). Body length 2600. Head, length 270; median width 260; postocular setae 90; ocellar setae 60. Pronotum, length 170; median width 320; major setae – am 30, aa 35, ml 40, epim 110, pa 60. Forewing, length 1000; distal width 100; sub-basal setae 30, 65, 65; number of duplicated cilia 8(11). Tergite IX setae B_1 120; B_2 120; B_3 160. Tube, length 220; basal width 95. Antennal segments III–VIII length 105, 100, 78, 70, 50, 35.

♀ microptera. Colour and structure very similar to macroptera, body size a little smaller; meso- and metanota slightly more transverse; forewing lobe length 150.

♂ microptera. Colour similar to ♀; usually small in size but variable due to allometry; small ♂ similar to ♀ but with foretarsal tooth present and weak median thickening on pronotum; large ♂ with head and pronotum more elongate, epimeral setae stout and posteroangular setae long and fine, forefemora greatly swollen, tarsal tooth large.

Measurements (small and large paratype ♂ collected with holotype in μm). Body length 1800 (2100). Head, length 225 (260). Pronotum, length 160 (200); major setae – epim 75 (75), pa 52 (90). Tube length 180 (195).

Specimens studied

Holotype ♀ macroptera, **New Zealand**: South Island, 5 ml south of Blenheim, Taylors Pass, at base of *Juncus* in seepage by roadside, 7.ii.1979 (*L. A. Mound* 1418) (NZAC).

Paratypes (8 ♀ mac., 29 ♀, 6 ♂ mic.). **New Zealand**. South Island: 1 ♀ mac, 4 ♀ mic, 2 ♂ collected with holotype; 1 ♀ mac, 7 ♀ mic, 1 ♂, also 1 ♀ mac, 5 ♀ mic collected at two similar sites about 10 miles south of holotype locality (*L. A. Mound* 1422; *A. K. Walker* 56); Nelson, Lee Valley, 1 ♀ hemimac, 1 ♂ on *Juncus*, 22.iii.1977 (*A. K. Walker*); Nelson, Rough Is., 1 ♀ mac, 1 ♀ mic on grass, 24.i.1976 (*A. K. Walker*); St Arnaud, Lake Rotoiti, 1 ♀ mac, 6 ♀ mic, 1 ♂ swept from swampy grassland, 9.xii.1980 (*A. K. Walker*); 10 ml north of Reefton, 1 ♀ on *Juncus*, 6.ii.1979 (*L. A. Mound* 1409); Beaumont, 1 ♀ at roadside, 17.ii.1976 (*G. W. Ramsay*); Invercargill, 3 ♀ mac, 1 ♀ mic on *Juncus*, 15–17.iii.1977 (*A. K. Walker*). North Island: Whakatane, 1 ♀ mic, 18.x.1978; 10 ml north of Helensville, 1 ♀, 1 ♂ in *Cotula* swamp, 23.ix.1973 (*B. A. Holloway*) (NZAC & BMNH).

Comments. This new species bears some resemblance to *rhizophorae* Girault from Australia (Mound, 1974*a*) but has the head much less narrowed to the base, the forewings pale, and the mid and hind femora not yellow on the distal posterior margins. It appears to be closely related to the other New Zealand species which were originally described in *Rhaebothrips*, but unlike all of them has the median antennal segments more or less yellow basally. The species is evidently associated with damp grassland rather than native woodland in New Zealand, but unfortunately no attempt was made to identify the *Juncus* species on which it was collected to determine whether or not this was itself native. Micropterae, as opposed to apterae, are not common in Diceratothripina; one female paratype is hemimacropterous with the wing lobe extending to tergite II and bearing fringe cilia.

PHACOTHRIPS Mound

(Figs 141, 158, 166, 186)

Phacothrips Mound, 1974*b*: 170. Type-species: *Gastrothrips ocelloides* Hood, by monotypy.

The single species in this genus is difficult to interpret. The body form, with its swollen tube (Fig. 158), elongate median sternites, and no forewing duplicated cilia, is similar to *Acallurothrips quadraticeps*. However, the mesopraesternum is well developed, antennal segment VIII slender and distinct from VII (Fig. 166) and the pelta (Fig. 186) similar to *Gastrothrips* species. Moreover, the head is unusual in bearing a pair of isolated 'ommatidia' on the cheeks (Fig. 141). Mound (1974*b*) interpreted the genus as being derived from *Neosmerinthothrips*, several species of which have very similar antennae and also a rather 'heavy' tube.

Species included

ocelloides (Hood, 1950: 9–12) (*Gastrothrips*). Holotype ♀, Brazil (USNM).

PSEUDOEURHYNCHOTHRIPS Moulton

Pseudoeurhynchothrips Moulton, 1949: 482–3. Type-species: *Pseudoeurhynchothrips bidens* Moulton, by monotypy.

This genus was based on a single crushed and distorted female specimen with the following characteristics: antennae 8-segmented, 2 sense cones on III, 4 on IV; eyes slightly reduced?; postocellar setae about as long as distance between 2 ocelli; stylets broad, wide apart in head?; praepectus present; mesopraesternum boat-shaped; metathoracic sternopleural sutures short; anapleural sutures complete; pronotal epimeral sutures complete; foretarsal tooth almost as long as tarsal width; pelta with short slender lateral wings; tergites II–VI with one pair of sigmoid wing-retaining setae; tube and setae on tergite IX long. This combination of characters is also found in *Dichaetothrips mameti* which is therefore also transferred to this genus. Only females of *mameti* are known; these have a smaller foretarsal tooth, and the postocellar setae arise in line with the hind margins of the posterior ocelli. A male labelled as part of the *mameti* type-series in the Paris Museum apparently represents *Ethirothrips stenomelas*. The genus *Pseudoeurhynchothrips* cannot be distinguished satisfactorily from *Nesothrips*, but is probably derived from *Neosmerinthothrips* through development of a straight-sided tube.

Species included
bidens Moulton, 1949: 483. Holotype ♀, South Africa (BMNH).
mameti (Priesner, 1951: 363) (*Dichaetothrips*). Holotype ♀, Mauritius (SMF). **Comb. n.**

SPOROTHRIPS Hood

(Figs 140, 147, 150, 170)

Sporothrips Hood, 1938*c*: 410. Type-species: *Adiaphorothrips amplus* Hood, by monotypy.

The single species in this genus could equally well be considered as an aberrant member of *Diceratothrips*. The similarities in body form are most evident between the females of the two genera, although males of *amplus* bear a similar sound-producing structure on the forecoxae to that found in *Diceratothrips* males. The metathoracic sternopleural sutures are very short in *amplus* (Fig. 150), but the anapleural sutures are long and curved, ending opposite a small tubercle, particularly in males. The antennal sense cones are short as in *Diceratothrips* species, but VIII is not broadly joined to VII (Fig. 170) and the anteocellar setae are stout (Fig. 140). In addition to a long foretarsal tooth the males have a long tubercle at the apex of the foretibiae (Fig. 147). Females simply have the inner apex of the foretarsi slightly prolonged. Specimens of *amplus* have been studied from Florida, Georgia and south Carolina (in BMNH).

Species included
amplus (Hood, 1925*a*: 221–2) (*Adiaphorothrips*). Holotype ♀, U.S.A.: Florida (USNM).

Genera of Macrothripina

This group was erected by Karny (1921*a*) as a subfamily to include seven genera of large thrips most of which are retained in the group in the present revision. Priesner (1961) did not use this group name, and he placed the nominate genus *Macrothrips* in his 'Elaphrothrips-group' of the Idolothripini. Macrothripina is used here for an apparently monophyletic group of 12 genera from the Old World tropics plus *Diplacothrips* from the Neotropics. All of the included species lack metathoracic sternopleural sutures in contrast to most Pygothripini. The area of greatest diversity of the subtribe is evidently South East Asia.

Within the Macrothripina two major genus-groups can be distinguished, the *Aesthesiothrips*- and *Ethirothrips*-groups. *Aesthesiothrips* (Fig. 200), *Polytrichothrips* (Fig. 195) and *Tarassothrips* (Fig. 196) all have long maxillary stylets which are close together medially, and antennal segment III shorter than IV (Figs 251–253). Moreover, *Dichaetothrips* (Fig. 199) and *Celidothrips* (Fig. 201), which resemble each other, as well as *Peltariothrips* (Fig. 194) and *Tarassothrips* (Fig. 196), in the presence of an ommatidium-like structure on each cheek, also

have long stylets. *Aesthesiothrips, Peltariothrips, Tarassothrips* and some *Dichaetothrips* species have unusually long antennal sense-cones (Fig. 254). The pelta is unusually variable between species in this *Aesthesiothrips* genus-group, being particularly aberrant in *Peltariothrips* (Fig. 212), although in most Macrothripina it is either *Ethirothrips*-like or *Diaphorothrips*-like (Figs 228–234). Despite this structure, *Peltariothrips* appears to be intermediate between the *Aesthesiothrips* group and the *Ethirothrips* group in having the stylets further apart. Both genus-groups exhibit a tendency for a tubercle to be developed at the inner apex of the foretibia (Figs 220–221), this characteristic being variable within some genera.

The *Ethirothrips* genus-group includes many more species than the *Aesthesiothrips* group referred to above. *Ethirothrips* itself is a large, diverse genus from which *Herathrips* is a monobasic derivative with short stylets (Fig. 188). *Diaphorothrips* is another small derivative from this large genus in which the four species have stout ocellar setae and a sub-apical tubercle on the foretibiae. *Machatothrips* species are very similar to *Diaphorothrips* species in the form of the head and pelta, although the forefemora bear a series of tubercles in females usually (Figs 217–219). *Ischyrothrips* is used for a single species with forelegs like *Machatothrips*, but with short ocellar setae and the pelta similar to *Ethirothrips* species rather than *Diaphorothrips* species. Finally, small females of *Macrothrips* are essentially similar to *Diaphorothrips* species, although large males of *Macrothrips* are subject to allometric growth and develop large tubercles on the head and thorax (Fig. 206).

AESTHESIOTHRIPS Ananthakrishnan

(Figs 200, 216, 221, 238, 251)

Aesthesiothrips Ananthakrishnan, 1961*a*: 253. Type-species: *Aesthesiothrips jatrophae* Ananthakrishnan, by monotypy.

This monobasic genus, from India and Malaya, was redefined by Palmer & Mound (1978). It is similar to *Polytrichothrips* in having very long maxillary stylets which are close together in the middle of the head (Fig. 200), and in having antennal segment III shorter than IV (Fig. 251). However, the antennal sense cones are unusually long, as in *Tarassothrips* and some *Dichaetothrips* species but unlike *Polytrichothrips* (Fig. 243). The pelta is roughly triangular (Fig. 216) but recessed into the anterior margin of tergite II, and the foretibiae in both sexes bear a small apical tubercle (Fig. 221).

SPECIES INCLUDED

jatrophae Ananthakrishnan, 1961*a*: 253–4. Holotype ♀, INDIA (TNA).

CELIDOTHRIPS Priesner

(Figs 201, 215, 241)

Celidothrips Priesner, 1951: 361. Type-species: *Docessissophothrips adiaphorus* Karny, by monotypy.

Ommatidothrips Mound, 1970: 120–2. Type-species: *Ommatidothrips lawrencei* Mound, by monotypy. [Synonymised by Mound, 1974: 36.]

This genus was redefined with a key to the four known species by Mound (1974*a*). Since then several females from Singapore and Kuala Lumpur have been examined which may represent *adiaphorus* although the postocellar setae are relatively longer than the holotype and the tube relatively shorter. A single male from New Guinea also represents this genus and has the metanotum raised into a flange-like tubercle as in *dolichos* and *lawrencei*. Characterisation of species within the genus is at present unsatisfactory due to patterns of allometric growth and sexual dimorphism. The species resemble those placed in *Dichaetothrips* in having an isolated ommatidium-like structure behind the eye on each cheek (Fig. 201), although the pelta is different in structure (Fig. 215) and the antennal sense cones short (Fig. 241).

SPECIES INCLUDED

adiaphorus (Karny, 1923: 328–31) (*Docessissophothrips*). Holotype ♀, JAVA (SMF).

camelus (Karny, 1920*c*: 43) (*Adiaphorothrips*). Lectotype ♂, Australia (NRS).
dolichos (Hood, 1918*b*: 144) (*Cryptothrips*). Holotype ♂, Australia (USNM).
lawrencei (Mound, 1970: 122–3) (*Ommatidothrips*). Holotype ♀, Guadalcanal (BMNH).

DIAPHOROTHRIPS Karny

(Figs 205, 207, 208, 214, 220)

Diaphorothrips Karny, 1920*a*: 186. Type-species: *Diaphorothrips unguipes* Karny, by monotypy.
Diaphorothrips (*Cnemidothrips*) Priesner, 1940: 403. Type-species: *Diaphorothrips hamipes* Karny, by original designation.

Palmer & Mound (1978) redefined *Diaphorothrips* with a key to the three Oriental species, but Sakimura (1979) has described a further species from Fiji. A foretibial tubercle is present in both sexes arising sub-apically (Fig. 220), whereas only a few species in related genera have such a tubercle and in these it is apical in position. The unique holotype of *kraussi* has not been studied, but the other three species have a pair of pores on the metanotum, an unusual characteristic in the *Ethirothrips*-group of genera, although found in *E. brevis*, and the pelta is triangular with the lateral corners recurved (Fig. 214). The type-species *unguipes* has the anteocellar setae longer than the postocellars although the reverse is true in other members of the genus (Fig. 205). This is another example of the ineffectiveness of the lengths of the ocellar setae as indicators of relationship. Variation in length of these setae is discussed under the related genera *Ethirothrips* and *Dichaetothrips*, as well as under *Diceratothrips* and *Neosmerinthothrips* in the Diceratothripina.

Species included
clavipes Priesner, 1940: 403–5. Holotype ♀, Riau Is. (SMF).
hamipes Karny, 1923: 296–9. Syntype ♀, Java (SMF).
***kraussi** Sakimura, 1979: 313–5. Holotype ♀, Fiji (BPBM).
unguipes Karny, 1920*a*: 186–9. Syntype ♀, Sri Lanka (SMF).
  thevetii Ananthakrishnan, 1957: 101–2. Holotype ♀, India (TNA).
  spinosus Ananthakrishnan, 1959: 321–2. Holotype ♀, India (TNA).

DICHAETOTHRIPS Hood

(Figs 199, 202, 225–227, 235, 236, 248, 254–256)

Dichaetothrips Hood, 1914: 164. Type-species: *Dichaetothrips brevicollis* Hood, by monotypy.

This genus has had a confused nomenclatural history, although the solitary female specimen from Guyana on which it was based does not appear to have been studied by any subsequent author. The generic name is derived from a pair of large postocellar setae, as figured in the original description, and because of these setae *brevicollis* has been associated with a variety of other species in which the ocellar setae are more or less developed.

Stannard (1957) treated *Dichaetothrips* as a subgenus of *Diceratothrips*, but species of the latter genus can be distinguished by the presence of well-developed metathoracic sternopleural sutures. The unique holotype of *D. brevicollis* lacks these sutures as do all species of Macrothripina. Moreover, no other specimen which the present authors would accept as congeneric with *brevicollis* has been studied from the New World, whereas at least two species from South East Asia appear to be very closely related. Since *brevicollis* has not been collected again it seems possible that the original specimen may have been artificially introduced. However, *Diplacothrips*, with two species from South America, is closely related to *Dichaetothrips*.

The holotype of *brevicollis* has a most unusual D-shaped pelta (Fig. 226), and despite its size and well developed wings the tergal wing-retaining setae are straight (Fig. 235). Moreover, antennal segments III–IV are unusually slender and slightly clubbed (Fig. 254), and the sense cones are elongate. Finally, there is an isolated, weakly developed ommatidium on the cheek just behind each eye. The Asian specimens here related to this species share these characters but do not have the elongate postocellar setae of *brevicollis* (Fig. 202). However, the length of the ocellar setae is variable in *Ethirothrips* (even within species, e.g. *stenomelas*), *Diaphorothrips*

and *Diceratothrips*, and also varies between species in *Neosmerinthothrips*. The lack of elongate ocellar setae is therefore not accepted here as grounds for excluding these Asian species from *Dichaetothrips* and the genus is redefined as follows.

Large dark Pygothripini; head (Figs 199, 202) with cheeks almost parallel and straight, with a few pairs of stout setae and an isolated ommatidium-like structure behind each compound eye; maxillary stylets retracted almost to postocular setae, sub-parallel and about one-third of head width apart. Antennae (Fig. 256) 8-segmented, VIII slender and constricted at base; sense cones long and curved, 2 on III, 4 on IV; segment IV usually longer than III. Pronotum short but wide, anterior margin heavily thickened, anterior setae short; epimeral sutures complete; praepectus present, probasisternal plates large; mesopraesternum boat-shaped. Mesonotal lateral setae and metanotal median setae small. Metathoracic sternopleural sutures not developed. Foretarsal tooth present in both sexes. Wings, when present, broad with many duplicated cilia, sub-basal setae B_2 and B_3 elongate. Pelta occupying scarcely one-third of anterior margin of tergite II, without lateral lobes (Figs 225–227). Tergites II–VI with one pair of straight or weakly sigmoid wing-retaining setae (Figs 235–236); tube variable, sometimes exceptionally broad and heavy.

SPECIES INCLUDED
brevicollis Hood, 1914: 164–5. Holotype ♀, GUYANA (USNM).
okajimai sp. n. Holotype ♀, SINGAPORE (OCT).
secutor sp. n. Holotype ♀, THAILAND (OCT).

Dichaetothrips okajimai sp. n.

(Figs 202, 227, 236, 256)

Macropterous ♀. Colour dark brown, tube darkest, tarsi paler; median area of antennal segment III, also pedicels of IV–V, yellowish; forewing with apical fifth pale but extensively shaded along median margins and with one longitudinal dark line in basal two-thirds; major setae shaded (specimens all cleared).

With the characters in the generic definition. Head slightly constricted behind eyes (Fig. 202), ommatidium-like structure reduced or absent; postocular setae much longer than pronotal setae; postocellar setae small. Foretibia with a small but stout apical tubercle; foretarsal tooth long and curved. Pelta reticulate distally, apex constricted. Sternites IV–VI (VII in large individuals) with paired transverse areas of specialised sculpture (Fig. 236).

Measurements (holotype ♀ in μm). Body length 5500. Head, length 600; maximum width 340; postocular setae 240. Pronotum, length 250; width 540; major setae – am 40; aa 40; ml 40; epim 90; pa 130. Forewing, length 2200; distal width 200; sub-basal setae 30, 90, 150; number of duplicated cilia 36/39. Tergite IX setae, B_1 600; B_2 550; B_3 550. Tube, length 800; basal width 200; terminal setae 200. Antennal segments I–VIII length, 120; 100; 180; 200; 200; 150; 115; 115.

Macropterous ♂. Very similar to ♀ in colour and structure; sculptured areas on sternites IV–VII almost continuous medially.

Measurements (paratype ♂ in μm). Body length 3200. Head, length 570; postocular setae 240. Pronotum, length 270; width 570; major setae – epim 150; pa 180. Tube length 600.

SPECIMENS STUDIED
Holotype ♀, **Singapore**: Macritchie Park, on dead branches, 22.vii.1976 (*S. Okajima*) (OCT).
Paratypes. 2 ♀, 1 ♂ collected with holotype (OCT; 1 ♀ BMNH).

COMMENTS. This species differs from the other two members of the genus in the slight constriction of the head behind the eyes, and in the presence of sternal reticulate areas. Moreover the pronotal midlateral setae are shorter and the median antennal segments paler than in the other species. The tube is longer than the head in the type-series, but this is probably subject to allometric growth and may not be true of smaller specimens. Unlike *brevicollis* the foretibiae bear a stout apical tubercle.

Dichaetothrips secutor sp. n.

(Figs 199, 225, 255)

Macropterous ♀. Colour dark brown, extreme base of antennal segment III and all tarsi paler; tube black; major setae weakly shaded; forewing largely pale with two longitudinal dark lines (specimens all cleared).

Head similar to *brevicollis* but with postocellar setae short and stout (Fig. 199); one pair of ommatidia-like structures weakly developed on cheek just behind compound eyes. Antennal segment III asymmetrical (Fig. 255), otherwise similar to *okajimai*. Foretibiae with a small apical tubercle. Pelta (Fig. 225) and anapleural suture as in *brevicollis*; wing-retaining setae on tergites IV–VI straight and not directed mesad. Tube very heavy and tapering. Sternites without reticulate areas.

Measurements (holotype ♀ in μm). Body length 5400. Head, length 560; width 340; postocular setae 320. Pronotum, length 230; width 550; major setae – am 15; aa 75; ml 220; epim 320; pa 130. Mesonotal lateral setae 6. Metanotal median setae 65. Forewing, length 2300; distal width 240; sub-basal setae 60, 180, 180; number of duplicated cilia 50. Tergite IX setae B_1 500; B_2 450. Tube, length 570; basal width 250, terminal setae 200. Antennal segments III–VIII length, 175; 195; 185; 135; 95; 80.

Specimens studied

Holotype ♀, **Thailand**: North, Doi suthep, in dead leaves, 800 m, 7.viii.1976 (*S. Okajima*) (OCT).

Specimens excluded from type-series. **Thailand:** East, Chanta Buri, 1 ♀ mic. in dead leaves, 30.iii.1975 (*S. Yamaguchi*). **Laos:** Vang-Viong, 1 ♀ mac. in dead leaves, 21.iii.1975 (*S. Yamaguchi*). **West Malaysia:** Tanah Rata, 1 ♀ mic., 5.iii.1976 (*W. Suzuki*). **Japan:** Amami-ohshima, Hatsuno, 1 ♀ mic. in dead leaves, 4.vii.1972 (*S. Okajima*) (OCT).

Comments. The four specimens listed above are excluded from the type-series for the following reasons. The macropterous female from Laos is slightly smaller than the holotype, with only one dark longitudinal line on the forewing, and with the ommatidium-like structure on the cheeks more evident; this is almost certainly conspecific with the *secutor* holotype. The micropterous female from Japan has larger setae (po 400 μm) but is also probably the same species. However, the micropterous female from Malaya has the tube rather shorter (500 μm) with the margins very slightly convex. This specimen has longer wing remnants and larger ocelli than the specimen from Japan. Finally the micropterous female from eastern Thailand is almost apterous and has the tube remarkably broad (length 390 μm; width 260) with the lateral tubercles distinctly more emergent. If this material all represents *secutor* then the range of variation, particularly of the tube, is remarkable. From *brevicollis* this species can be recognised by the tubercle on the foretibiae, and from *okajimai* by the head shape and antennal colour as well as the lack of sternal reticulate sculpture.

DIPLACOTHRIPS Hood **gen. rev.**

(Figs 197, 222, 239, 245)

Diplacothrips Hood, 1937*c*: 506–7. Type-species: *Diplacothrips borgmeieri* Hood, by monotypy.

This genus was treated by Stannard (1957) as a synonym of *Dichaetothrips* which was itself placed as a subgenus of *Diceratothrips*. In the course of the present studies *Diceratothrips* has been recognised as a genus of Neotropical species and placed in the Diceratothripina, all species of which have well developed metathoracic sternopleural sutures. *Diplacothrips* is here treated as a valid genus, very similar to *Dichaetothrips* but distinguished by short antennal sensoria (Fig. 245) and long preocellar setae (Fig. 197). Both species in the genus have the tube broadly conical (Fig. 239), both of them have a D-shaped pelta as in *Dichaetothrips* (Fig. 222), but neither of them have sternal reticulate areas. The generic definition of *Dichaetothrips* (q.v.) applies to *Diplacothrips* with the exceptions noted above. This is the only genus of Macrothripina endemic to the New World.

Species included

borgmeieri Hood, 1937*c*: 507–9. Holotype ♀, Peru (USNM).
piceus Hood, 1952*c*: 161–2. Holotype ♀, Brazil (USNM).

ETHIROTHRIPS Karny

(Figs 187, 189–193, 228–234, 244, 249, 250)

Liothrips (*Ethirothrips*) Karny, 1925: 133. Type-species: *Liothrips thomasseti* Bagnall (here regarded as a synonym of *Phlaeothrips stenomelas* Walker, 1859), by subsequent designation, Priesner, 1949: 129.

Scotothrips Priesner, 1939*a*: 75. Type-species: *Adiaphorothrips elephas* Karny, by original designation. **Syn. n.**

Paracryptothrips Moulton, 1944: 281. Type-species: *Paracryptothrips inermis* Moulton, by original designation. **Syn. n.**

Percipiothrips Ananthakrishnan, 1964*a*: 72. Type-species: *Mesothrips indicus* Bagnall, by monotypy. **Syn. n.**

Elaphridia Ananthakrishnan, 1964*a*: 90. Type-species: *Elaphrothrips agasthya* Ramakrishnan, by monotypy. **Syn. n.**

Eurynotothrips Moulton, 1968: 119. Type-species: *Eurynotothrips latapennis* Moulton, by monotypy. **Syn. n.**

Uredothrips Ananthakrishnan, 1969*a*: 184–5. Type-species: *Uredothrips indicus* Ananthakrishnan, by monotypy. **Syn. n.**

Decothrips Ananthakrishnan, 1969*a*: 182. Type-species: *Decothrips anacardii* Ananthakrishnan, by monotypy. **Syn. n.**

Mound (1974*a*: 45, 92) has indicated some of the problems of relationships between the species of *Ethirothrips*, although at that time they were treated under the names *Dichaetothrips* and *Scotothrips*. Unfortunately for nomenclatural stability, *Dichaetothrips* is now recognised as a small genus of highly aberrant large species with the pelta remarkably small and D-shaped (Figs 225–227) and the wing-retaining setae reduced (Fig. 235). The next available generic name is *Ethirothrips*, and the type-species of both this and *Scotothrips* are very similar. Mound (1974*a*) chose to distinguish between these two on the basis of the length of the postocellar setae, although it was indicated that these setae are variable in length. Re-examination of almost all the described species in this group, together with several undescribed species, has convinced the authors that there is at present no way in which genera, or even satisfactory species-groups, can be defined in this complex. As a result *Ethirothrips* is used here for a wide range of species in which the postocellar setae are usually short but sometimes long, the cheeks usually bear a few setae but these may be very reduced or as numerous and strong as in *Machatothrips* species, the cheeks are usually straight but vary from convex or even sinuate to being sharply constricted basally, and the pelta usually has weak lateral lobes but is sometimes broad and entire. A foretarsal tooth is present in all males, but is absent in females of a few species; moreover in some species the foretibiae bear a small apical tubercle in one or both sexes. Thus, although apparently monophyletic, *Ethirothrips* is a diverse complex of species comprising a major element of the Old World Pygothripini. Generic relationships are discussed under Macrothripina.

Within *Ethirothrips* as treated here, the only species-group which is partially distinct is that represented by the name *Uredothrips*. This group includes *indicus, brevisetosus* and *tirumalaiensis* from India, together with *tibialis* from Japan and Malaya. These species have the eyes reduced in size and the maxillary stylets deeply retracted, but about one-third of the head width apart (Fig. 189). However, these characters do not distinguish the species sharply from *vitreipennis* from Africa (and India?), and *vitreipennis* cannot be distinguished at more than species level from *elephas*. Moreover, although *tibialis* and an undescribed species from Japan have a foretibial tubercle, this is not true of the three Indian species in *Uredothrips*, and although the tube is short and heavy in *indicus* but long in *brevisetosus*, it is intermediate in *tibialis* and *tirumalaiensis*. All these species have short ocellar setae.

Decothrips is available for a single species of the *Ethirothrips* group in which the head is deep and narrowed basally as in *brevis* (Fig. 193) but in which the metanotal pores are absent, the pelta broad and the antennae unusually slender (Fig. 244). This species seems to be at one end of the range of variation of *Ethirothrips*.

Elaphridia has been used for a single species *agasthya* (Figs 187, 228) and cannot be distinguished satisfactorily from other members of *Ethirothrips*. Contrary to Ananthakrishnan (1973*a*: 282) *agasthya* is not only unrelated to *crassiceps* Bagnall (now placed in *Dinothrips*), but neither of them are closely related to *Elaphrothrips*.

Percipiothrips was erected for a single species now in the *Ethirothrips*-group but at that time regarded as belonging in Phlaeothripinae. As Mound (1968: 82) has pointed out, the postocellar

setae of the *indicus* syntypes range in size from 35 to 60 μm, and this species is very similar to *stenomelas* (Fig. 190), apart from the pale antennal III. Although *indicus* Ananthakrishnan now stands as a secondary homonym of *indicus* Bagnall, a new name is not proposed here pending further studies at species level into potential synonyms.

Scotothrips was used by Mound (1974*a*) for a group of species mainly from Australia with stout cheek setae (Figs 191, 192). Within this group *latapennis*, the type-species of *Eurynotothrips*, is particularly large, and *australiensis* has a particularly short, broad head (Fig. 192). However, the majority of species in this group cannot be distinguished readily from the Oriental members of *Ethirothrips*, although a foretibial tubercle is found in several Australian but in no Oriental species. The type-species *elephas* can be distinguished from *stenomelas* mainly by the broader, entire pelta which lacks lateral wings.

Paracryptothrips was erected for two species, of which the type-species has a complete suture between antennal segments VII and VIII, although these segments are broadly joined. Apart from this character, and the yellow legs, *inermis* is very similar to several Australian species previously treated in *Scotothrips*. The second species (*fijiensis*) which was described in *Paracryptothrips* has 7-segmented antennae with no suture between VII and VIII, but although the female holotype lacks a foretarsal tooth a male specimen (in BMNH) apparently representing this species has a slender tooth almost as long as the foretarsal width.

The type-species of *Ethirothrips* was treated as a synonym of *brevicornis* by Mound (1974*a*: 46). However, the unique holotype of *Phlaeothrips stenomelas* Walker (Figs 190, 234, 250) from Sri Lanka was discovered recently in the BMNH, mounted dry on a card. This specimen, in excellent condition, is now mounted in balsam on a microscope slide and is evidently the same species as *brevicornis* and *thomasseti*. This species is widespread in the Old World tropics and material has now been studied from Seychelles, Rodrigues, Mauritius, Madagascar, Sri Lanka, Singapore, Malaya, Thailand, Java, Philippines, Ryukyus, Bonins, Fiji, Samoa, Hawaii, New Guinea, Solomon Is. and Australia. Moreover, a female specimen in the Zoologisches Museum, Berlin, labelled ‘Liothrips gigas’ and ‘New Britannien/Ralum/F. Dahl S’ is here accepted as the holotype of *gigas* Karny and this is synonymised with *stenomelas*.

Another widespread species of which the name is changed in this paper is *claripennis*, here accepted as a junior synonym of *brevis*. Mound (1968) observed that the tube of the damaged unique holotype of *brevis* is heavily sculptured, but this is now interpreted as being an artefact due to excessive bleaching of this very crushed specimen. The form of the pelta and the presence of a pair of pores on the metanotum distinguish this species (Mound, 1974*b*: 177).

Chen (1980) also refers to a sculptured tube when describing a new species, *virgulae*, from Taiwan. Examination of a paratype of this species has revealed that this effect is also due to excessive bleaching and crushing in a water-soluble mountant. This sculpture, although an integral part of the structure of the tube, is not normally visible except in heavily bleached specimens. Mounting techniques of this sort are quite unsuitable for serious taxonomic work. The original illustration by Chen of *virgulae* indicates clearly the damaged condition of the paratype studied; the head is flattened and swollen medially and the pronotum distorted. Fortunately *virgulae* appears to be a common species extending from Taiwan along the Ryuku chain of islands.

Several names from India are now placed in synonymy under *obscurus*, and to these are here added *fungivorus* from the Congo and *neivei* from Cuba. This species has long postocellar setae and a small pelta with lateral wings (Fig. 233). In contrast, *uredinis*, which looks similar at first sight, has a broad pelta without lateral wings, similar to that of *firmus* (Fig. 229) and more typical of species previously referred to *Scotothrips*. Although *indicus* Bagnall is similar in general appearance to *obscurus*, it is unusual in having long antennal sense cones as in *Dichaetothrips* (Fig. 249).

SPECIES INCLUDED

acanthus (Hood, 1919*b*: 88–90) (*Cryptothrips*). Holotype ♀, AUSTRALIA (USNM). **Comb. n.**

sjostedti Karny, 1920*c*: 42 (*Cryptothrips*). Holotype ♂, AUSTRALIA (NRS).

sismondini Girault, 1926: 1 (*Adiaphorothrips*). Holotype ♀, AUSTRALIA (QMB).

nox Girault, 1928*a*: 2 (*Adiaphorothrips*). Holotype ♀, AUSTRALIA (QMB).
differens Priesner, 1928*b*: 656–7 (*Adiaphorothrips*). Holotype ♀, AUSTRALIA (SMF).
adventor (Bianchi, 1945: 259–60) (*Dichaetothrips*). Holotype ♀, NEW CALEDONIA (BPBM). **Comb. n.**
agasthya (Ramakrishna, 1934: 10–12) (*Elaphrothrips*). Syntypes ♀, INDIA (TNA). **Comb. n.**
anacardii (Ananthakrishnan, 1969*a*: 182–4) (*Decothrips*). Syntypes ♂ ♀, INDIA (TNA). **Comb. n.**
australiensis (Moulton, 1968: 95–6) (*Gastrothrips*). Holotype ♀, AUSTRALIA (CAS). **Comb. n.**
barretti (Mound, 1974*a*: 94–7) (*Scotothrips*). Holotype ♀, AUSTRALIA (ANIC). **Comb. n.**
beesoni (Moulton, 1928*e*: 5–6) (*Dichaetothrips*). Holotype ♀, INDIA (CAS). **Comb. n.**
brevis (Bagnall, 1921*a*: 276–7) (*Adiaphorothrips*). Holotype ♂, SEYCHELLES (BMNH). **Comb. n.**
claripennis Moulton, 1934: 503 (*Dichaetothrips*). Holotype ♀, HAWAII (CAS). **Syn. n.**
trinidadensis Hood, 1935*b*: 168–70 (*Gastrothrips*). Holotype ♀, TRINIDAD (USNM). **Syn. n.**
indicus Ananthakrishnan, 1968*c*: 967–9 (*Nesothrips*). Syntype ♂ ♀, INDIA (TNA). **Syn. n.**
diversus Ananthakrishnan, 1972*b*: 434–6 (*Nesothrips*). Holotype ♀, INDIA (TNA). **Syn. n.**
brevisetosus (Ananthakrishnan & Jagadish, 1970: 266–8) (*Diceratothrips*). Holotype ♀, INDIA (TNA). **Comb. n.**
distasmus (Mound, 1974*a*: 97–8) (*Scotothrips*). Holotype ♀, AUSTRALIA (ANIC). **Comb. n.**
dracon (Karny, 1920*c*: 43) (*Adiaphorothrips*). Holotype ♂, AUSTRALIA (NRS). **Comb. n.**
elephas (Karny, 1920*c*: 43) (*Adiaphorothrips*). Lectotype ♀, AUSTRALIA (NRS). **Comb. n.**
fijiensis (Moulton, 1944: 282–3) (*Paracryptothrips*). Holotype ♀, FIJI (BPBM). **Comb. n.**
****firmus*** (Hood, 1952*c*: 162) (*Gastrothrips*). Lectotype ♀, BRAZIL (USNM). **Comb. n.**
giraulti (Hood, 1918*b*: 148–9) (*Adiaphorothrips*). Holotype ♂, AUSTRALIA (USNM). **Comb. n.**
hibisci (Moulton & Steinweden, 1933: 32–3) (*Neoheegeria*). Holotype ♀, SOCIETY IS. (BPBM). **Comb. n.**
longus Moulton, 1944: 297–300 (*Neoheegeria*). Holotype ♀, FIJI (BPBM).
latus fijiensis Moulton, 1944: 270–1 (*Cryptothrips*). Holotype ♂, FIJI (BPBM).
indicus (Ananthakrishnan, 1969*a*: 185) (*Uredothrips*). Syntype ♀ ♂, INDIA (TNA). **Comb. n.**
indicus (Bagnall, 1921*b*: 365–6) (*Mesothrips*). Lectotype ♀, INDIA (BMNH). **Comb. n.**
inermis (Moulton, 1944: 281–2) (*Paracryptothrips*). Holotype ♀, FIJI (BPBM). **Comb. n.**
io (Girault, 1926: 1) (*Adiaphorothrips*). Lectotype ♂, AUSTRALIA (QMB). **Comb. n.**
latapennis (Moulton, 1968: 119–21) (*Eurynotothrips*). Holotype ♀, AUSTRALIA (CAS). **Comb. n.**
longisetis (Ananthakrishnan & Jagadish, 1970: 268–9) (*Diceratothrips*). Holotype ♀, INDIA (TNA). **Comb. n.**
madagascariensis (Bagnall, 1936: 220–1) (*Cryptothrips*). Holotype ♀, MADAGASCAR (MNHN). **Comb. n.**
****meridionalis*** (Zur Strassen, 1976: 247) (*Diceratothrips*). Holotype ♀, ST HELENA (MRAC). **Comb. n.**
obscurus (Schmutz, 1913: 1074–6) (*Ischyrothrips*). Holotype ♀, SRI LANKA (NMV). **Comb. n.**
karnyi Bagnall, 1924: 639–40 (*Mesothrips*). Lectotype ♀, INDIA (BMNH). **Syn. n.**
fungivorus Priesner, 1939*b*: 52–4 (*Dichaetothrips*). Syntypes ♀ ♂, CONGO (SMF). **Syn. n.**
gloveri Ramakrishna & Margabandhu, 1939: 31–2 (*Neosmerinthothrips*). Lectotype ♀, INDIA (TNA). **Syn. n.**
neivei Hood, 1940*a*: 576–9 (*Dichaetothrips*). Holotype ♀, CUBA (USNM). **Syn. n.**
usitatus Ananthakrishnan & Jagadish, 1970: 273–4 (*Diceratothrips*), replacement name for *indicus* Ananthakrishnan, 1961*b*: 270–1 (*Dichaetothrips*). Holotype ♀, INDIA (TNA). **Syn. n.**
stenomelas (Walker, 1859: 224) (*Phlaeothrips*). Holotype ♀, SRI LANKA (BMNH). **Comb. n.**
brevicornis Bagnall, 1910*b*: 696–8 (*Diceratothrips*). Holotype ♂, HAWAII (BMNH). **Syn. n.**
niger Schmutz, 1913: 1080–4 (*Ischyrothrips*). Syntypes ♀ ♂, SRI LANKA (NMV). **Syn. n.**
gigas Karny, 1913*b*: 133–4 (*Liothrips*). Holotype ♀, NEW BRITAIN (ZMB). **Syn. n.**
thomasseti Bagnall, 1921*a*: 288–9 (*Liothrips*). Lectotype ♀, RODRIGUES (BMNH). **Syn. n.**
nigricornis Bagnall, 1921*a*: 278–9 (*Liothrips*). Lectotype ♀, SEYCHELLES (BMNH). **Syn. n.**
intrepidus Bagnall, 1921*a*: 279 (*Liothrips*). Holotype ♀, SEYCHELLES (BMNH). **Syn. n.**
setidens Moulton, 1928*a*: 129–30 (*Mesothrips*). Holotype ♀, HAWAII (BPBM). **Syn. n.**
niger Moulton & Steinweden, 1935: 165 (*Cryptothrips*). Holotype ♀, MARQUESAS IS. (BPBM). **Syn. n.**
madagascariensis Bagnall, 1936: 222. Holotype ♀, MADAGASCAR (MNHN). **Syn. n.**
sybarita (Mound, 1974*a*: 100) (*Scotothrips*). Holotype ♀, AUSTRALIA (ANIC). **Comb. n.**
tibialis (Okajima, 1975: 16–9) (*Uredothrips*). Holotype ♀, RYUKU IS. (OCT). **Comb. n.**
tirumalaiensis (Ananthakrishnan, 1969*b*: 298–9) (*Uredothrips*). Holotype ♀, INDIA (TNA). **Comb. n.**
uredinis (Ananthakrishnan & Jagadish, 1970: 269–71) (*Diceratothrips*). Holotype ♀, INDIA (TNA). **Comb. n.**
virgulae (Chen, 1980: 180–1) (*Scotothrips*). Holotype ♀, TAIWAN (BCIQ). **Comb. n.**
vitreipennis (Priesner, 1939*b*: 54–5) (*Scotothrips*). Syntypes ♀, CONGO (SMF). **Comb. n.**

SPECIES REMOVED TO PHLAEOTHRIPINAE
Teuchothrips burroughsi (Girault) (Mound, 1974*a*: 45) (*Dichaetothrips*).
Akainothrips pallicornis (Karny) (Palmer & Mound, 1978: 186) (*Adiaphorothrips*).

HERATHRIPS Mound

(Fig. 188)

Herathrips Mound, 1974*a*: 54. Type-species: *Adiaphorothrips nativus* Girault, by monotypy.

This genus was erected for a single large Australian species with a broad pronotum as in *Macrothrips*, but a small head with the stylets not deeply retracted (Fig. 188).

SPECIES INCLUDED
nativus (Girault, 1928*c*: 2) (*Adiaphorothrips*). Lectotype ♂, AUSTRALIA (QMB).

ISCHYROTHRIPS Schmutz

(Fig. 213)

Ischyrothrips Schmutz, 1913: 1074. Type-species: *Ischyrothrips crassus* Schmutz, by subsequent designation, Priesner, 1949: 134.

Of the four species described by Schmutz in this genus *obscurus* is placed in *Ethirothrips, spinosus* in *Dinothrips* and *niger* is a synonym of *Ethirothrips stenomelas*. The unique female holotype of *crassus* has very broad forefemora bearing 7 to 10 small tubercles on the inner margin and the foretibia is ridged on the inner surface. Although closely related to *Machatothrips* this genus can be distinguished by the absence of a pair of long ocellar setae, and the form of the pelta (Fig. 213, cf. Fig. 210).

SPECIES INCLUDED
crassus Schmutz, 1913: 1076–8. Holotype ♀, SRI LANKA (NMV).

MACHATOTHRIPS Bagnall

(Figs 203, 204, 210, 217–219, 237, 246, 247)

Machatothrips Bagnall, 1908*b*: 189. Type-species: *Machatothrips biuncinatus* Bagnall, by monotypy.
Adiaphorothrips Bagnall, 1909*c*: 536. Type-species: *Adiaphorothrips simplex* Bagnall, by original designation. [Synonymised by Priesner 1939: 75.]
Cnestrothrips Priesner, 1932: 344; 1939: 75. Type-species: *Cnestrothrips dammermani* Priesner, by original designation. [Synonymised by Palmer & Mound 1978.]

This genus was revised recently by Palmer & Mound (1978) with keys to 14 species. However, species recognition in the genus is exceptionally difficult and recently collected material in the collections of Dr Shuji Okajima indicates that it is still not possible to distinguish satisfactorily between intraspecific and interspecific variation in *Machatothrips*. In most species of this genus females rather than males bear the obvious sexually dimorphic characteristics; however, Palmer & Mound described two species from Malaya in which males share the female sex-linked character of a row of teeth on the fore femora. *Machatothrips* is closely related to *Diaphorothrips* and *Macrothrips*.

SPECIES INCLUDED
antennatus (Bagnall, 1915*b*: 594) (*Adiaphorothrips*). Lectotype ♀, BORNEO (BMNH).
dammermani Priesner, 1932: 344 (*Cnestrothrips*). Holotype ♀, RIAU Is. (SMF).
artocarpi Moulton, 1928*c*: 322. Holotype ♀, TAIWAN (CAS).
biuncinatus Bagnall, 1908*b*: 189. Holotype ♀, NEW GUINEA (BMNH).
simplex Bagnall, 1909*c*: 537 (*Adiaphorothrips*). Lectotype ♂, BORNEO (BMNH).
montanus Priesner, 1932: 344. Holotype ♀, BORNEO: Sarawak (SMF).
braueri Karny, 1912*a*: 23. Holotype ♀, CAMEROUN (ZMB).
braueri f. *karnyi* Priesner, 1932: 340. Holotype ♀, CONGO (? lost).
multidens Bagnall, 1934*a*: 487. Lectotype ♀, GHANA (BMHN).
paucidens Bagnall, 1934*a*: 489. Lectotype ♀, GHANA (BMNH).

paucidens var. *bicolorisetosus* Bagnall, 1934*a*: 489. Lectotype ♀, Sierra Leone (BMNH).
celosia Moulton, 1928*c*: 325. Holotype ♀, Taiwan (CAS).
corticosus Ananthakrishnan, 1972*c*: 443. Holotype ♀, India (TNA).
decorus Palmer & Mound, 1978: 193. Holotype ♀, West Malaysia (BMNH).
****diabolus*** (Priesner, 1928*c*: 56) (*Adiaphorothrips*). Holotype ♀, East Africa (lost).
haplodon Karny, 1925: 141. Holotype ♀, Uganda (BMNH).
braueri var. *buffai* Karny, 1925: 142. Holotype ♂, Uganda (BMNH).
simplicidens Bagnall, 1934*a*: 490. Holotype ♀, Congo (MNHN).
heveae Karny, 1921*c*: 61. Holotype ♀, Java (SMF).
indicus Ananthakrishnan & Jagadish, 1970: 279. Holotype ♀, India (TNA).
lentus Palmer & Mound, 1978: 194–5. Holotype ♀, West Malaysia (BMNH).
quadrudentatus Moulton, 1947*a*: 179. Holotype ♀, New Guinea (CAS).
silvaticus Ananthakrishnan, 1972*b*: 436. Holotype ♀, India (TNA).

MACROTHRIPS Bagnall

(Figs 206, 209, 240)

Macrothrips Bagnall, 1908*a*: 359. Type-species: *Macrothrips papuensis* Bagnall, by original designation.

As discussed by Palmer & Mound (1978) this genus is very close to *Machatothrips*. All the specimens which have been studied are here interpreted as representing a single variable species. The males vary in size very considerably, the largest being bigger than any other Thysanoptera. However, the available males do not vary greatly in structure; large and smaller individuals all have recurved tubercles on the forecoxae, the postero-median pronotal margin prolonged backwards, the antero-lateral pronotal margins slightly emarginate, and a pair of short stout setae on tubercles behind the eyes (Fig. 206). Females vary much less in size, but are structurally more variable. The forecoxae have at most a short straight tubercle and the forefemoral tubercle is absent in small individuals. In contrast to males, however, large females have a prominent pronotal epimeral tubercle, although this is not present in small females. The foretibial tubercles also seem remarkably variable; the 'typical' condition involves two short, acute tubercles, one apical, the other subapical. However, the following variants have been studied: 2 ♀ lacking subapical tubercles; 1 ♀ lacking subapical but with apical also reduced; 1 ♀ lacking apical tubercle but with subapical well developed.

Species included
papuensis Bagnall, 1908*a*: 359–60. Holotype ♂, Papua New Guinea (BMNH).
dubius Bagnall, 1908*a*: 361. Holotype ♀, Papua New Guinea (BMNH). **Syn. n.**
intermedius Bagnall, 1908*b*: 187–9. Holotype ? ♂, Papua New Guinea (? lost).

PELTARIOTHRIPS gen. n.

(Figs 194, 198, 212, 242)

Type-species: *Peltariothrips insolitus* sp. n.

Dark brown species of Macrothripina. Head slightly wider than long, narrowed to base; cheeks with 5–6 spine-like setae, also an ommatidium-like structure ventro-laterally in posterior third (Fig. 194). Two pairs of postocular setae (1 short, 1 long); postocellar and anteocellar setae short; maxillary stylets retracted to compound eyes, about one-third of head width apart. Antennae 7-segmented, suture between VII–VIII incomplete; III shorter than IV; sense cones long and slender, two on III, four on IV (Fig. 242). Pronotum short, epimeral sutures complete; epimeral setae long; praepectus small. Foretarsal tooth present in both sexes. Metanotal median setae slender; metathoracic sternopleural sutures absent. Forewings with 10 duplicated cilia. Pelta triangular but with posterior margin concave, anterior margin of tergite II protruding into pelta (Fig. 212); tergites II–VII with one pair of wing-retaining setae; tergite IX setae about 0·8 times as long as tube. Tube about as long as head, sides straight and tapering. Sternites with a transverse row of discal setae; median sternites of ♂ with a pair of reticulate (? glandular) areas laterally.

The type-species of this new genus is unusual in the Macrothripina in having antennal segments VII–VIII fused. Segment III is shorter than IV, with the sense cones long and slender (Fig. 242), but these characters are also found in *Aesthesiothrips* and *Tarassothrips*. The pelta is unique (even in the

entire family Phlaeothripidae) (Fig. 212), although this structure is also unusual in the related genera *Dichaetothrips*, *Polytrichothrips* and one species of *Tarassothrips*. Moreover, a single specimen of a *Machatothrips* has been studied (in BMNH) from Singapore, which is generally similar to *M. antennatus* but has the pelta intermediate in structure between *Machatothrips* and *Peltariothrips*.

Peltariothrips insolitus sp. n.

Macropterous ♀. Colour dark brown, pterothorax and pelta paler, tube black with apex pale; antennal segment I whitish yellow, II–IV brownish yellow, V–VI brown distally; femora pale in distal half, foretibiae and all tarsi brownish yellow; major setae dark; forewings shaded, slightly paler medially but with a longitudinal dark line.

With the structural characters indicated in generic definition; head and median area of metanotum without sculpture; sub-basal wing setae short.

Measurements (holotype ♀ in μm). Body length 2515. Head, length 276, maximum width 310; basal width 240; postocular seta – inner 6/20, outer 38/52. Pronotum, length 150; width 348; major setae – am 26/40, aa 22, ml 28/38, epim 174, pa 26, pm 18. Metanotal median setae 46/56. Forewing, length 1055; median width 104; sub-basal setae 15, 40, 40; number of duplicated cilia 9/12. Tergite IX setae, B_1 210; B_2 200; B_3 200. Tube, length 270; basal width 124; terminal setae 120. Antennal segments III–VII length, 80; 96; 82, 65; 90.

Macropterous ♂. Similar to ♀ in colour and structure; mesothoracic spiracle slightly enlarged and toothed in profile; sternites III–V with a pair of reticulate areas anterolaterally.

Measurements (paratype ♂ in μm). Body length 2050. Head, length 234; maximum width 252; width at base 195; postocular setae – inner 12, outer 40. Pronotum, length 132; width 290; epimeral setae 60/88. Forewing, length 820; number of duplicated cilia 4. Tergite IX setae, B_1 195; B_2 210: B_3 210. Tube, length 200; basal width 98. Antennal segments III–VII length, 70, 75, 85, 50, 70.

Specimens studied

Holotype ♀, **Singapore:** Singapore City, on dead twigs, 15.i.1979 (*L. A. Mound*) (BMNH).

Paratypes. **Singapore:** 1 ♀, same data as holotype (BMNH); Macritchie Park, 2 ♀, 1 ♂ on dead *Areca*, 22.vii.1976 (*S. Okajima*) (OCT).

Specimens excluded from type-series. **Philippines:** Mindanao, Agko, Mt Apo, 57 ♀, 3 ♂ on *Alpinia* sheath, 2 ♀ on Palmae leaves, viii.1979; Luzon, Quezon National Forest Park, 9 ♀ on dead Palmae leaves, vii.1979 (*S. Okajima*) (OCT).

Comments. The sternal reticulate areas on the male of this species are similar in appearance to those found in *Dichaetothrips* and *Tarassothrips*. However, the production of the mesothoracic spiracle into a dentate structure is not found in any other genus of Macrothripina. Through the courtesy of Dr Shuji Okajima, several series of specimens have been studied from the Philippines which are very similar to the types of *insolitus*. The specimens from Mindanao are much larger than the types from Singapore and by themselves would certainly be regarded as a distinct species. However, the specimens from Luzon are intermediate in size and structure. Most of the Mindanao individuals were collected from *Alpinia* (Zingiberaceae), and the Luzon individuals from Palmae. Since the only two individuals from Palmae on Mindanao are themselves intermediate in size between the two main series (Fig. 198), the pattern of variation might reflect the existence of two or more host-limited or locality-limited species. The alternative interpretation is adopted here that only one, widely distributed and variable species is involved. One male from *Alpinia* on Mindanao is micropterous with the mesothoracic spiracular processes greatly enlarged.

POLYTRICHOTHRIPS Priesner

(Figs 195, 211, 243)

Polytrichothrips Priesner, 1939*a*: 77. Type-species: *Polytrichothrips pilosus* Priesner (here regarded as a synonym of *Docessissophothrips laticeps* Bagnall), by monotypy.

The only species in this genus lacks metathoracic sterno-pleural sutures, but unlike most Macrothripina, it has elongate maxillary stylets (Fig. 195). As in *Aesthesiothrips*, these stylets

are very long, retracted to the eyes, and lie close together medially in the head; however, in contrast to that genus the antennae do not have greatly elongate sense cones (Fig. 243). The pelta, which is almost devoid of sculpture as is the metanotum, bears a pair of pores in the holotype of *pilosus* although these are not present in the holotype of *laticeps* (Fig. 211). The genus is known only from these two individuals which are here regarded as representing one species.

SPECIES INCLUDED

laticeps (Bagnall, 1915*a*: 322–3) (*Docessissophothrips*). Holotype ♀, BORNEO: Sarawak (BMNH). **Comb. n.**
pilosus Priesner, 1939*a*: 77–8. Holotype ♀, BORNEO: Sarawak (SMF). **Syn. n.**

TARASSOTHRIPS gen. n.

(Figs 196, 223, 224, 252, 253)

Type-species: *Tarassothrips akritus* sp. n.

Large, blackish brown species of Macrothripina. Head about 1·5 times as long as wide; cheeks with short spine-like setae, also, in anterior third, a pair of ommatidia-like structures; post ocular setae long, ocellar setae small; maxillary stylets deeply retracted and close together medially (Fig. 196). Antennae 8-segmented, III shorter than IV; sense cones long and slender, two on III, four on IV (Figs 252, 253). Pronotum short, epimeral sutures complete, posteroangular and epimeral setae long; praepectus present. Both sexes with forefemora enlarged, inner margin often rugose; foretibiae with inner apical tooth; foretarsal tooth well developed. Metanotal median setae small and slender. Forewings with two longitudinal dark bands and about 70 duplicated cilia. Pelta recessed into tergite II, either similar to *Diaphorothrips* and *Aesthesiothrips* or broadly rounded (Figs 223, 224). Tergites II–VI each with one pair of wing-retaining setae; setae on IX about 0·8 times as long as tube. Tube about 1·2 times as long as head, slightly constricted at apex. Sternites with transverse row of discal setae; median sternites of both sexes (usually) with paired reticulate areas anterolaterally.

This new genus is closely related to *Aesthesiothrips* but has a shorter head without long ocellar setae. It resembles *Celidothrips, Peltariothrips* and *Dichaetothrips* in having an ommatidium-like structure on each cheek, moreover some species of the last genus have similar reticulate areas on the sternites. Two species of *Tarassothrips* are known and these differ from each other in the form of the pelta (Figs 223, 224).

Tarassothrips akritus sp. n.

(Figs 196, 224, 253)

Macropterous ♀. Colour dark brown, antennal segment III and apex of tube paler. With the structural characters given in the generic definition; antennal III shorter than IV, major sense cones on IV about as long as that segment (Fig. 253), but three minor sense cones also present on dorsal surface. Head with one pair of anteocellar setae; post ocellar setae small (Fig. 196). Pelta triangular with narrow lateral lobes, recessed into anterior margin of tergite II (Fig. 224).

Measurements (holotype ♀ in μm). Body length 3900. Head, length 470; width 325; post ocular setae 96/114. Pronotum, length 200; width 438; major setae, am 46/50; aa 45/50; ml 58/90; epim 162/170; pa 176/185. Metanotal median setae 64. Forewing, length 1700; median width 136; sub-basal setae B_1 65; B_2 145; B_3 228. Tergite IX setae, B_1 460; B_2 488. Tube, length 556; basal width 142. Antennal segments III–VIII length, 124; 200; 194; 120; 95; 80.

Macropterous ♂. Colour and structure similar to ♀.

Measurements (paratype ♂ in μm). Body length 3350. Head length 438; width 276; postocular setae 110. Pronotum, length 180; width 380; major-setae, epim 148/168; pa 142. Tergite IX setae, B_1 396; B_2 420/430. Tube length 430; basal width 128. Antennal segments III–VIII length, 115; 156; 148; 100; 76; 68.

SPECIMENS STUDIED Holotype ♂, **Malaya:** Buklanyan, on dead branches, 26.xii.1971 (*Floyd Andre*) (BMNH).

Paratypes. **Malaya:** 1 ♀, same data as holotype; Kuala Lumpur, 2 ♂ on pods of 'Singapore', 27.xii.1969 (*R. G. & F. Andre*). **Singapore:** Macritchie Park, on dead twigs, 1 ♂, 11.viii.1980, 1 ♀, 19.viii.1980 (*L. A. Mound*) (BMNH).

COMMENTS. This new species is remarkable amongst Idolothripinae for the extreme length of the antennal sense cones. In the BMNH collections there is a single female on a slide without data which was acquired with the Andre Collection (Mound, 1974*c*) together with other material from Malaysia. Because of the lack of data this specimen is not formally named here, but it differs from *akritus* in its large size (body length 5800 μm), larger antennal segment III (III 266 μm: IV 286 μm), shorter sense cones (Fig. 252), absence of small dorsal sense cones on segment IV, broadly oval pelta (Fig. 223), and reduced foretarsal tooth. This specimen also has paired areas of specialised reticulation on the median sternites; however, the smallest female paratype of *akritus* (Macritchie Park) lacks these areas.

Tribe **IDOLOTHRIPINI**

Priesner (1961) and Jacot-Guillarmod (1978) recognised five subtribes in this group (Table 2). *Apelaunothrips* and *Dexiothrips* (Apelaunothripina) are here treated as Phlaeothripinae (p. 88) and Atractothripina is synonymised with Hystricothripina (= Zeugmatothripina). The genera listed by Priesner under the name Megathripina are here treated with *Idolothrips* in the Idolothripina. However, most of the genera listed by Priesner in Idolothripina are here treated in Hystricothripina. Moreover, the *Elaphrothrips*-group of Priesner is here considered as a subtribe although *Campulothrips*, *Macrothrips* and *Sporothrips* are re-assigned to the Pygothripini.

As a result, only three subtribes are now recognised, involving 33 genera and 277 species. The Hystricothripina (predominantly New World) and Idolothripina (predominantly Old World) are treated as sister-groups, on the grounds that they are the only members of the tribe with the tube hairy. These two probably constitute the sister-group of the Elaphrothripina, although this subtribe cannot be defined on any single characteristic. In fact, the Elaphrothripina show similarities to the Pygothripini in the plesiomorphic form of the anapleural sutures. Moreover, *Anactinothrips* has only one pair of sigmoid setae on each tergite as in all pygothripine species. None of the species in the Idolothripini has metathoracic sternopleural sutures developed, although these sutures are commonly found in species of Pygothripini with the exception of the Macrothripina.

Genera of Elaprothripina subtrib. n.

This group is used here in the same sense as that of the 'Elaphrothrips Gruppe' of Priesner (1961), although it is treated formally as a subtribe for the first time, and is restricted to 10 genera. The generic name *Hartwigia* q.v. was proposed for a new, monobasic subtribe by Stannard (1976), but this name was not constructed in accordance with the recommendations of the *Code of Zoological Nomenclature* and is not accepted here as being valid. The genus *Hartwigia*, however, is here treated within the *Elaphrothrips*-group for the first time. Species of Elaphrothripina, in contrast to those of the Idolothripina and Hystricothripina, do not have any dominant setae laterally on the tube (i.e. tube not hairy), and the anapleural sutures are much longer and stronger, completely separating the anepisterna from the katepisterna. The praepectal plates are well developed, the maxillary stylets widely spaced, the metathoracic sternopleural sutures not developed, and there are usually two pairs of wing-retaining setae on each tergite.

The majority of Elaphrothripina species are placed in *Elaphrothrips*, a widespread tropical genus which extends into the Nearctic. The species of *Anactinothrips*, a Neotropical genus, are unique in the Idolothripini in retaining the plesiomorphic character state of a single pair of wing-retaining setae on each tergite, and this genus may represent the sister-group of the rest of the Elaphrothripina. *Mecynothrips*, from the Austro–Oriental Region, has the remarkable apomorphic character state of three pairs of wing-retaining setae on each tergite, and may represent the sister-group of the other Old World genera of this subtribe. Finally, *Dinothrips* and *Tiarothrips* species share the apomorphic character state of the foreocellus just posterior to the major ocellar setae, in contrast to *Elaphrothrips* and its derivatives *Lamillothrips* and *Ophthalmothrips* which have the foreocellus arising far forward on the head. *Dermothrips* and *Malesiathrips* are also placed in this subtribe provisionally, although they do not appear to be closely related to the other genera.

ANACTINOTHRIPS Bagnall

(Figs 263, 295, 311)

Anactinothrips Bagnall, 1909*d*: 329. Type-species: *Anactinothrips meinerti* Bagnall, by monotypy.
Ophidothrips Schmutz, 1910: 273. Type-species: *Ophidothrips handlirschii* Schmutz, by monotypy.
Lophothrips Karny, 1911: 503. Type-species: *Lophothrips antennatus* Karny, by monotypy.

Both *Ophidothrips* and *Lophothrips* were placed as synonyms of *Anactinothrips* by Moulton (1933: 416), and this synonymy was retained by Stannard (1957). However, Jacot-Guillarmod (1978) listed the three genera separately. The syntype female of *antennatus* has been compared with the syntype male of *meinerti*, and these two specimens very probably represent the same species. In both of them, antennal segments V–VII bear a prominent apical lobe, and the rest of the body is very similar. These two species, together with *borgmeieri* and *silvicola*, have a relatively long tube, and there is no doubt that *Lophothrips* should be placed in synonymy with *Anactinothrips*. (The data on the *antennatus* holotype are 'Paraguay, leg. Fiebrig, 27.vii.05'.) In contrast, the tube of *distinguendus*, *longisetis* and *vigilans* is relatively short, as is that of *handlirschii* judging from the original illustration, but there appears to be no reason to use a separate generic name for these species.

Fifteen species are now placed in *Anactinothrips* but, since most of these have been collected only once and there is no knowledge of their structural variation, some synonymy is to be expected. These species are rather similar in general appearance to *Cyphothrips* in the Hystricothripina, with two pairs of stout setae on the vertex (Fig. 263), foretarsal tooth present in males but absent in females, metanotum with a pair of stout setae, metathorax rather bulbous laterally, and abdominal tergites with only one pair of wing-retaining setae (Fig. 295). However, in contrast to most Hystricothripina, the forewings are relatively broad, the praepectal plates are well developed, and the tube is relatively short without conspicuous hairs laterally. The similarities to Hystricothripina are here interpreted as being due to convergence, or more probably, parallel evolution if *Anactinothrips* is accepted as the sister-group of the other genera in Elaphrothripina. The males of *Anactinothrips* have a sharp angle on the posterior margin of the forefemora and a series of ridges on the forecoxae which are probably involved in sound production.

SPECIES INCLUDED

antennatus (Karny, 1911: 503) (*Lophothrips*). Syntypes ♂♀, PARAGUAY (ZMB).
borgmeieri Hood, 1950: 34–8. Holotype ♀, BRAZIL (USNM).
*__brachyura__ Hood, 1941: 227–230. Holotype ♀, PERU (USNM).
*__cristatus__ Hood, 1936*b*: 146–7. Holotype ♀, PERU (USNM).
distinguendus Bagnall, 1914*c*: 379–380. Holotype ♂, GUYANA (BMNH).
*__fuscus__ Moulton, 1933*a*: 418–9. Holotype ♂, BRAZIL (CAS).
gibbifer Zur Strassen, 1980: 48–53. Holotype ♀, BRAZIL (SMF).
*__graphidura__ Hood, 1938*d*: 245–7. Holotype ♀, PERU (USNM).
*__handlirschii__ (Schmutz, 1910: 273–276) (*Ophidothrips*). Syntypes ♀ ♂, ?BRAZIL (?lost).
longisetis Bagnall, 1926: 556–7. Holotype ♀, GUYANA (BMNH).
*__marginipennis__ Hood, 1941: 223–7. Holotype ♀, PERU (USNM).
meinerti Bagnall, 1909*d*: 330–2. Syntypes ♂♀, VENEZUELA (BMNH).
*__nigricornis__ Hood, 1936*b*: 143–6. Holotype ♀, GUYANA (USNM).
silvicola Hood, 1952*c*: 167–8. Holotype ♀, BRAZIL (USNM).
vigilans Hood, 1938*a*: 241–5. Holotype ♀, PERU (USNM).

DERMOTHRIPS Bagnall

(Figs 276, 281, 290, 300)

Dermothrips Bagnall, 1910*b*: 677–8. Type-species: *Dermothrips hawaiiensis* Bagnall, by monotypy.

The relationships of this monobasic genus are far from clear. It was placed in the Gastrothripina by Priesner (1961), but the metathoracic sternopleural sutures are not developed, and there are two sense cones on antennal segments III and IV (Fig. 290). One macroptera has been studied

and this bears two pairs of wing-retaining setae on the median abdominal tergites. On the basis of these characters the genus is here provisionally referred to the Elaphrothripina. As in *Malesiathrips*, to which it is probably related, the metathoracic anapleural sutures appear to be long and complete (Fig. 281), but the basal antennal segments do not bear long setae. These two genera are not closely related to *Elaphrothrips* but may represent relicts associated with the evolution of the Hystricothripina.

SPECIES INCLUDED

hawaiiensis Bagnall, 1910*b*: 678–80. Lectotype ♀, MAUAI Is. (BMNH).

DINOTHRIPS Bagnall

(Figs 277–279, 298, 310)

Dinothrips Bagnall, 1908*b*: 190. Type-species: *Dinothrips sumatrensis* Bagnall, by monotypy.

Paxillothrips Ananthakrishnan, 1961*a*: 250. Type-species: *Paxillothrips longicauda* Ananthakrishnan, by monotypy. [Synonymised by Palmer & Mound, 1978: 166.]

The five species now recognized in this genus were revised recently by Palmer & Mound (1978) with a discussion of the patterns of variation and resultant complex synonymy. In both sexes the pelta is divided completely into three segments (Fig. 310); however the genus is usually recognised by the presence in males of a curiously expanded mesothoracic spiracular process (Fig. 278). Unfortunately, although typically forked in some species this process is simple in others, and is reduced or absent in small males (Fig. 279) as well as all females. *Dinothrips* species resemble short-bodied *Elaphrothrips* species in general appearance, but they share with *Tiarothrips* the apomorphic character state of having the foreocellus situated just posterior to the major ocellar setae (Fig. 277).

SPECIES INCLUDED

juglandis Moulton, 1933*b*: 6. Holotype ♂, INDIA (BMNH).
longicauda (Ananthakrishnan, 1961*a*: 250–3) (*Paxillothrips*). Holotype ♀, INDIA (TNA).
monodon Karny, 1920*b*: 204. Holotype ♂, PHILIPPINES (SMF).
spinosus (Schmutz, 1913: 1078) (*Ischyrothrips*). Holotype ♀, SRI LANKA (NMV).
  affinis Bagnall, 1915*c*: 270. Lectotype ♂, BORNEO (BMNH).
  crassiceps Bagnall, 1921*c*: 399 (*Dicaiothrips*). Holotype ♀, BURMA (BMNH).
  jacobsoni Karny, 1921: 283. Holotype ♂, JAVA (SMF).
  kemneri Karny, 1923: 294. Lectotype ♂, JAVA (SMF).
  anodon Karny, 1923: 295. Syntypes ♂ ♀, JAVA (unknown).
  gardneri Moulton, 1928*e*: 290. Holotype ♂, INDIA (CAS).
  malloti Moulton, 1933*b*: 6. Holotype ♂, INDIA (BMNH).
  celebensis Bagnall, 1934*a*: 485. Holotype ♂, SULAWESI (MNHN).
sumatrensis Bagnall, 1908*b*: 191. Lectotype ♂, SUMATRA (BMNH).
  furcifer Schmutz, 1913: 1026. Holotype ♂, SRI LANKA (?lost).
  fulmeki Priesner, 1959: 55. Holotype ♂, SUMATRA (SMF).

ELAPHROTHRIPS Buffa

(Figs 270–272, 282, 284–286, 293, 299, 307–309)

Elaphrothrips Buffa, 1909: 162–3. Type-species: *Idolothrips coniferarum* Pergande, by subsequent designation, Andre, 1940: 76.

Dicaiothrips Buffa, 1909: 169–70. Type-species: *Thrips schottii* Heeger, by subsequent designation, Bagnall, 1910: 370. [Synonymised by Hood, 1927: 238–9.]

Klinothrips Bagnall, 1918: 217–8. Type-species: *Klinothrips femoralis* Bagnall, by monotypy. [Synonymised by Priesner, 1952: 845.]

Elaphrothrips (*Elaphoxothrips*) Bagnall, 1932: 517. Type-species: *Kleothrips athletes* Karny, by monotypy.

Elaphridothrips Priesner, 1932: 320. Type-species: *Elaphridothrips andrapterus* Priesner, by monotypy. [Synonymised by Priesner, 1952: 861.]

Palinothrips Hood, 1952*c*: 168. Type-species: *Palinothrips palustris* Hood, by monotypy. **Syn. n.**

Elaphrothrips (*Paraclinothrips*) Priesner, 1952: 846. Type-species: *Elaphrothrips* (*Paraclinothrips*) *coniger* Priesner, by monotypy.

Elaphrothrips (*Cradothrips*) Ananthakrishnan, 1973*a*: 273. Type-species: *Elaphrothrips* (*Cradothrips*) *insignis* Ananthakrishnan, by monotypy.

Palmer & Mound (1978: 172) point out that *Elaphridia* is unrelated to *Elaphrothrips*, and the genus is here treated in the Pygothripini. *Elaphridothrips* was erected for a single apterous species with small eyes, reduced wing-retaining setae and a degenerate, transverse pelta. *Dicaiothrips* appears to have been erected for males, in contrast to the female characteristics stressed for *Elaphrothrips*. Bagnall erected *Elaphoxothrips* without discriminatory characters, adding 'should a subgeneric name appear desirable, I suggest . . .'. *Klinothrips* and *Paraclinothrips* were each proposed for single species with greatly enlarged forefemora in males (Fig. 285), but as the femora are subject to allometry, that is they are not enlarged in small males, the group names are of little significance. In contrast, *Cradothrips* was used for an Indian species, remarkable in this group, that has tuberculate femora in the females. Finally, *Palinothrips* was erected for a single species, taken from grasses in Brazil, which shows remarkable parallelism with the Old World *Ophthalmothrips* in that the eyes are prolonged ventrally (Fig. 270). However, this species has very stout cheek setae and is here interpreted as an aberrant species of *Elaphrothrips*.

More than 150 species-group names are available in *Elaphrothrips*, although 37 of these are listed below in synonymy. Much of this synonymy was established by Mound (1968) recognising sexual dimorphism and allometric variation, and by Palmer & Mound (1978) expanding the concept of polytypic species each with widespread distributions. Prior to these studies, many of the described species from the Oriental Region were known from single specimens or single collections, and further studies on new material from the Afrotropical Region will undoubtedly establish further synonymy. Hood (1955) and Hartwig (1948) have discussed some of the patterns of variation which occur in this genus. Antennal segment lengths, head and tube length, size of forelegs, also the pronotum and certain tubercles, are all subject to allometry, often being greatly enlarged in larger males. In contrast the postocular setae are sometimes smaller in larger individuals. This type of variation occurs within populations, but in addition different populations of a species can be expected to exhibit differences including different patterns of variation.

Elaphrothrips is the largest, most widespread, and probably the most diverse of the genera in the Idolothripinae. It is found throughout the tropics, although apparently replaced by *Mecynothrips* east of Sulawesi. There appear to be no essential differences between the species-groups found in South America, Africa and India which would enable geographically limited subgenera to be recognised. However, the pelta of several species in South America tends to have the anterior sculpture differentiated from the posterior sculpture (Fig. 307); this has not been reported in African and Oriental species. Africa is evidently the area of greatest diversity of the genus, with numerous species ranging in body form from the large elaborate males of *femoralis* to small, slender, almost featureless species on grasses. These latter species are very similar to small species of *Ophthalmothrips*, whereas *Lamillothrips* is evidently derived from the opposite extreme of the range of variation in *Elaphrothrips*. There appears to be no justification, neither practical nor theoretical, in subdividing this large genus at present.

SPECIES INCLUDED

acanthomerus Hood, 1941: 217–20. Holotype ♂, PERU (USNM).
****addendus*** Priesner, 1928*c*: 59–60. Syntypes ♂, PARAGUAY (?lost).
****aethiopiae*** Bagnall, 1936: 225–6. Holotype ♂, ? ETHIOPIA (MNHN).
affinis (Bagnall, 1908*b*: 213–4) (*Idolothrips*). Holotype ♀, NICARAGUA (BMNH).
  assimilis Bagnall, 1908*b*: 213 (*Idolothrips*). Holotype ♀, NICARAGUA (BMNH).
  distinctus Bagnall, 1910*a*: 378–9 (*Dicaiothrips*). Holotype ♂, NICARAGUA (BMNH).
****africanus*** (Trybom, 1908: 16–7) (*Idolothrips*). Syntypes ♀, TANZANIA (unknown).
****albospinosus*** Moulton, 1929*b*, 11–2. Holotype ♀, MEXICO (CAS).
amazonicus Johansen, 1978*b*: 95–7. Holotype ♀, PERU (BMNH).
****amoenus*** Priesner, 1935*a*: 174, 241–2. Holotype ♂, NORTH VIETNAM (SMF).
andrapterus (Priesner, 1932: 321–2) (*Elaphridothrips*). Syntypes ♂, ZAIRE (MRAC).

angustatus (Bagnall, 1910*a*: 380–2) (*Idolothrips*). Holotype ♂, VENEZUELA (BMNH).
****angusticeps*** (Crawford, 1910: 168–70) (*Idolothrips*). Syntypes ♀ ♂, MEXICO; BELIZE; NICARAGUA; CUBA (?Canada D. of Agric.).
****angustifrons*** (Bergroth, 1888: xxx–xxxi) (*Phloeothrips*). ?Holotype, BRAZIL (?lost).
antennalis Bagnall, 1921*c*: 398. Holotype ♂, JAPAN (BMNH).
armatus (Hood, 1908*c*: 285–7) (*Idolothrips*). Lectotype ♀, U.S.A.: Illinois (USNM).
athletes (Karny, 1923: 355–8) (*Kleothrips*). Holotype ♂, JAVA (SMF).
aztecus Hood, 1941: 208–13. Holotype ♂, MEXICO (USNM).
bagnallianus Priesner, 1952: 863. [Replacement name for *clarispinis* Bagnall nec Priesner, 1935.]
clarispinis Bagnall, 1935: 134–5. Holotype ♂, ZAMBIA (BMNH).
bakeri (Karny, 1920*b*: 206–9) (*Dicaiothrips*). Holotype ♂, PHILIPPINES (SMF).
mentaweiensis Priesner, 1929*b*: 201–4. Holotype ♂, MENTAWEI IS. (SMF).
bakeri var. *depokensis* Priesner, 1935*a*: 159. Syntypes ♂ ♀, JAVA (SMF).
imitator Priesner, 1935*a*: 249–50. Holotype ♂, JAVA (SMF).
****bilineatus*** Priesner, 1933*c*: 152. Holotype ♂, MEXICO (SMF).
blatchleyi Hood, 1938*c*: 410–3. Holotype ♀, U.S.A.: Florida (USNM).
borgmeieri Hood, 1955: 62–6. Holotype ♂, BRAZIL (USNM).
****bottegii*** (Buffa, 1909: 170) (*Dicaiothrips*). ?Holotype ♂, ?AFRICA (?lost).
brachypes Bagnall, 1934*a*: 495–7. Holotype ♂, EAST AFRICA (BMNH).
jeanneli Bagnall, 1935: 140–2. Holotype ♀, KENYA (BMNH).
brachyurus Bagnall, 1926: 555. Holotype ♀, SOUTH AFRICA (BMNH).
brasiliensis Johansen, 1978*b*: 104–5. Holotype ♂, BRAZIL (BMNH).
breviceps (Bagnall, 1921*c*: 399–400) (*Dicaiothrips*). Holotype ♀, KENYA (BMNH).
brevicornis (Bagnall, 1910*a*: 379–80) (*Dicaiothrips*). Holotype ♀, VENEZUELA (BMNH).
brunneipennis Bagnall, 1935: 130–2. Lectotype ♀, SAO THOMÉ (BMNH).
capensis Faure, 1942: 81–3. Holotype ♀, SOUTH AFRICA (NCIP).
****carayoni*** Bournier, 1971: 149–155. Holotype ♂, CENTRAL AFRICAN REPUBLIC (MNHN).
****cognatograndis*** Johansen, 1976: 63–5. Holotype ♂, MEXICO (UNAM).
congoensis Priesner, 1932: 334–5. Syntypes ♂ ♀, ZAIRE (MRAC).
conicurus Bagnall, 1934*a*: 497–8. Holotype ♀, VENEZUELA (MNHN).
coniferarum (Pergande, 1896: 63–4) (*Idolothrips*). Syntypes, U.S.A.: Washington, D.C. (USNM).
coniger Priesner, 1952*b*: 849–51 (subgenus *Paraclinothrips*). Holotype ♂, GUINEA (MNHN).
f. *gynaecoides* Priesner, 1952*b*: 851–2. Holotype ♂, GUINEA (MNHN).
constrictopeltatus Johansen, 1978*b*: 99–101. Holotype ♂, PERU (BMNH).
****coreanus*** Woo, 1974: 69–70. Holotype ♀, KOREA (Seoul Univ.).
costalimai Hood, 1955: 57–60. Holotype ♂, BRAZIL (USNM).
curvipes Priesner, 1929*b*: 206–8. Syntype ♂, MENTAWEI IS. (SMF).
karnyi Priesner, 1935*a*: 246–7. Holotype ♀, SUMATRA (SMF).
secus Ananthakrishnan, 1973*a*: 278. Holotype ♀, INDIA (TNA).
dampfi Hood, 1940*b*: 500–4. Holotype ♀, MEXICO (USMN).
decipiens Priesner, 1932: 331–3. Holotype ♂, ZAIRE (MNHN).
defectus Hood, 1941: 213–7. Holotype ♂, PERU (USNM).
denticollis (Bagnall, 1909*c*: 527) (*Dicaiothrips*). Holotype ♀, NIAS (BMNH).
beesoni Ramakrishna, 1934: 7. Syntypes ♂ ♀, INDIA (TNA).
mucronatus Priesner, 1935*a*: 167–8. Holotype ♂, JAVA (SMF).
sumbanus Priesner, 1935*a*: 169–70. Holotype ♂, SUMBA (SMF).
productus Priesner, 1935*a*: 170–4. Holotype ♂, SUMBA (SMF).
f. *obscuricornis* Priesner, 1935*a*: 171. Syntypes ♂ ♀, SUMBA (SMF).
****devius*** Priesner, 1952*b*: 857–8. Holotype ♂, CAMEROUN (MNHN).
distans Bagnall, 1935: 132–4. Holotype ♀, TANZANIA (BMNH).
****drepanatus*** (Priesner, 1927*c*: 82) (*Dicaiothrips*). Holotype ♂, GUINEA (?lost).
drepanifer (Faure, 1925: 162–6) (*Dicaiothrips*). Holotype ♂, SOUTH AFRICA (NCIP).
edouardi Jacot-Guillarmod, 1939*b*: 46–52. Holotype ♂, SOUTH AFRICA (AMG).
falcatus (Karny, 1912*c*: 150–1) (*Dicaiothrips*). Syntypes ♂, WEST AFRICA (unknown).
****fallax*** Priesner, 1952*b*: 853–4. Holotype ♂, CAMEROUN (MNHN).
****faurei*** Jacot-Guillarmod, 1939*a*: 67–70. Holotype ♂, MOZAMBIQUE (AMG).
femoralis (Bagnall, 1918: 218–9) (*Klinothrips*). Holotype ♂, GHANA (BMNH).
flavipes (Hood, 1908*a*: 377–8) (*Idolothrips*). Lectotype ♀, U.S.A.: Illinois (USNM).
foveicollis (Bagnall, 1908*b*: 214–5) (*Idolothrips*). Lectotype ♀, GUATEMALA (BMNH).

championi Bagnall, 1910*a*: 375 (*Dicaiothrips*). Holotype ♀, Guatemala (BMNH).
grandis Bagnall, 1910*a*: 373–4 (*Dicaiothrips*). Holotype ♂, Guatemala (BMNH).
fulmeki Priesner, 1935*a*: 242–3. Holotype ♂, Sumatra (SMF).
gaboniensis Bagnall, 1936: 224–5. Holotype ♀, Gabon (MNHN).
genaspinosus Moulton, 1928*b*: 245–7. Holotype ♀, Ethiopia (BMNH).
*****gnidiicolus*** (Hesse, 1934: 434–440) (*Dicaiothrips*). Holotype ♂, South Africa (?lost).
***gracilis** Moulton, 1933*a*: 410–1. Holotype ♀, Brazil (CAS).
*****gravis*** Priesner, 1952*b*: 852–3. Holotype ♀, Cameroun (MNHN).
greeni (Bagnall, 1914*b*: 289) (*Dicaiothrips*). Holotype ♂, Sri Lanka (BMNH).
bouvieri Vuillet, 1914: 276 (*Dicaiothrips*). Holotype ♂, India (BMNH).
micidus Ananthakrishnan, 1973*a*: 275–6. Holotype ♀, India (TNA).
*****guachichilis*** Johansen, 1977*b*: 53–5. Holotype ♂, Mexico (UNAM).
*****herricki*** Moulton, 1933*a*: 411–3. Holotype ♂, Peru (CAS).
impensus Morison, 1958: 595–7. Holotype ♀, Ethiopia (BMNH).
indagator Hood, 1936*d*: 436–40. Holotype ♂, Peru (USNM).
insignis Ananthakrishnan, 1973*a*: 273–5 (subgenus *Cradothrips*). Holotype ♀, India (TNA).
*****insperatus*** Johansen, 1978*a*: 87–9. Holotype ♂, Mexico (UNAM).
*****insularis*** Priesner, 1928*c*: 57–8. Holotype ♂, Java (lost).
jacobsoni Priesner, 1935*a*: 243–6. Holotype ♂, Sumatra (SMF).
jacotguillarmodi Johansen, 1978*b*: 101–4. Holotype ♂, Peru (BMNH).
laevicollis (Bagnall, 1910*a*: 375–6) (*Dicaiothrips*). Syntypes ♂ ♀, Venezuela (?lost).
laticeps Bagnall, 1935: 142–3. Holotype ♀, Tanzania (BMNH).
*****laticornis*** Jacot-Guillarmod, 1941: 96–100. Holotype ♀, South Africa (AMG).
longiceps (Bagnall, 1908*b*: 211–3) (*Idolothrips*). Holotype ♂, Mexico (BMNH).
*****longispinis*** Priesner, 1932: 329–30. Holotype ♂, Zaire (MRAC).
*****mabirensis*** (Priesner, 1925: 308–9) (*Dicaiothrips*). Holotype ♀, Kenya (unknown).
*****macateei*** Hood, 1955: 60–2. Holotype ♀, Brazil (USNM).
*****madagascariensis*** Bagnall, 1935: 138–40. Holotype ♀, Madagascar (MNHN).
magnus Johansen, 1978*b*: 97–9. Holotype ♂, Peru (BMNH).
mahensis (Bagnall, 1921*a*: 283–4) (*Dicaiothrips*). Holotype ♂, Seychelles (BMNH).
rex Bagnall, 1921*a*: 281–3 (*Dicaiothrips*). Holotype ♂, Seychelles (BMNH).
hystrix Bagnall, 1921*a*: 284–6 (*Dicaiothrips*). Holotype ♀, Seychelles (BMNH).
malayensis (Bagnall, 1909*c*: 525) (*Dicaiothrips*). Holotype ♂, Nias (BMNH).
bruneitarsis Schmutz, 1913: 1070 (*Dicaiothrips*). Holotype ♂, Sri Lanka (NMV).
var. *levis* Schmutz, 1913: 1072 (*Dicaiothrips*). Holotype ♀, Sri Lanka (NMV).
coronatus Bagnall, 1934*b*: 631. Holotype ♀, Sri Lanka (BMNH).
maynei Priesner, 1932: 325–7. Syntypes ♂ ♀, Zaire (?MRAC).
medius Hartwig, 1948: 85–96. Holotype ♂, South Africa (NCIP).
microacanthomerus Johansen, 1978*b*: 105–7. Holotype ♀, Peru (BMNH).
*****neodampfi*** Johansen, 1977*b*: 55–7. Holotype ♀, Mexico (UNAM).
*****neoleonensis*** Johansen, 1977*b*: 51–3. Holotype ♂, Mexico (UNAM).
*****neolongiceps*** Johansen, 1978*a*: 89–92. Holotype ♂, Mexico (UNAM).
*****niger*** Jacot-Guillarmod, 1939*b*: 56–60. Holotype ♂, South Africa (AMG).
*****nigricornis*** (Karny, 1912*c*: 139, 150) (*Idolothrips*). Syntypes ♀, Rio Muni ('Spanish Guinea') (SMF).
nigripes Jacot-Guillarmod, 1937: 28–31. Holotype ♂, Mozambique (AMG).
nitidus (Bagnall, 1910*a*: 372–3) (*Dicaiothrips*). Holotype ♂, Brazil (BMNH).
notabilis Ananthakrishnan, 1973*a*: 276–8. Holotype ♀, India (TNA).
*****oculatoides*** Priesner, 1932: 333–4. Holotype ♂, Zaire (MRAC).
oculatus Moulton, 1928*b*: 243–5. Holotype ♀, Ethiopia (BMNH).
orangiae Jacot-Guillarmod, 1937: 31–4. Holotype ♀, South Africa (AMG).
palustris (Hood, 1952*c*: 168) (*Palinothrips*). Lectotype ♀, Brazil (USNM). **Comb. n.**
*****paradampfi*** Johansen, 1977*b*: 57–9. Holotype ♀, Mexico (UNAM).
parallelus Hood, 1924: 315–7. Holotype ♀, U.S.A.: Florida (USNM).
*****parvus*** Priesner, 1936*b*: 102. Holotype ♂, Sudan (SMF).
peruviensis Hood, 1936*d*: 443–6. Holotype ♂, Peru (USNM).
powelli Jacot-Guillarmod, 1937: 25–8. Holotype ♂, South Africa (AMG).
*****priesneri*** Bagnall, 1926: 554. [Replacement name for *breviceps* Priesner, nec Bagnall.]
breviceps Priesner, 1921: 219 (*Dicaiothrips*). Syntypes ♂ ♀, Paraguay (ZMB).
procer (Schmutz, 1913: 1063) (*Dicaiothrips*). Holotype ♂, Sri Lanka (NMV).

novus Schmutz, 1913: 1066 (*Dicaiothrips*). Holotype ♂, Sri Lanka (NMV).
dallatorensis Schmutz, 1913: 1067 (*Dicaiothrips*). Holotype ♂, Sri Lanka (NMV).
proximus Bagnall, 1914*b*: 289 (*Dicaiothrips*). Holotype ♂, Sri Lanka (BMNH).
achaetus Bagnall, 1934*b*: 633. Holotype ♀, Sri Lanka (BMNH).
approximatus Bagnall, 1934*b*: 635. Holotype ♂, Sri Lanka (BMNH).
chandana Ramakrishna, 1934: 9. Holotype ♂, India (unknown).
eranthemi Seshadri & Ananthakrishnan, 1954: 224. Holotype ♂, India (TNA).
propinquus (Bagnall, 1910*a*: 377–8) (*Dicaiothrips*). Holotype ♂, Venezuela (BMNH).
*****prospector*** Hood, 1936*d*: 440–3. Holotype ♂, Peru (USNM).
****schottii*** (Heeger, 1852*a*: 139) (*Thrips*). Holotype ♂, Brazil (?lost).
****schoutedeni*** Priesner, 1932: 327–9. Holotype ♀, Zaire (MRAC).
****schultzei*** Priesner, 1933*c*: 152. Holotype ♀, Mexico (ZMB).
sensitivus Priesner, 1929*b*: 204–6. Holotype ♂, Mentawei Is. (SMF).
****separatus*** Priesner, 1928*c*: 58–9. Holotype ♀, Tanzania (lost).
seychellensis (Bagnall, 1921*a*: 280) (*Dicaiothrips*). Holotype ♀, Seychelles (BMNH).
****snodgrassi*** Hood, 1955: 66–9. Holotype ♂, Brazil (USNM).
spiniceps Bagnall, 1932: 514. Holotype ♀, India (BMNH).
graveleyi Bagnall, 1934*b*: 628. Holotype ♀, India (BMNH).
clarispinis Priesner, 1935*a*: 247–9. Holotype ♂, Java (SMF).
spiniprivus Priesner, 1952*b*: 855–6. Holotype ♂, Malawi (BMNH).
spinosus Moulton, 1933*a*: 413–4. Holotype ♀, Colombia (CAS).
stenocephalus (Bagnall, 1914*b*: 288–9) (*Dicaiothrips*). Holotype ♂, Tanzania (BMNH).
nigrospinosus Bagnall, 1932: 515–6. Holotype ♂, Tanzania (BMNH).
atrispinus Bagnall, 1935: 135–7. Holotype ♂, East Africa (BMNH).
variispinis Bagnall, 1935: 137–8. Holotype ♀, Tanzania (BMNH).
****surinamensis*** Priesner, 1925: 306–8. Syntype ♀, Surinam (?SMF).
****tener*** Priesner, 1925: 305–6. Holotype ♂, Mexico (SMF).
****transvaalensis*** Jacot-Guillarmod, 1939*b*: 60–2. Holotype ♂, South Africa (AMG).
tuberculatus (Hood, 1908*c*: 287–9) (*Idolothrips*). Lectotype ♀, U.S.A.: Illinois (USNM).
unicolor Moulton, 1933*a*: 415–6. Holotype ♀, Brazil (CAS).
****uniformis*** Buffa, 1909: 164. ?Holotype ♀, Guinea-Bissau (?lost).
vittipennis Hood, 1940*a*: 579–83. Holotype ♂, U.S.A.: Arizona (USNM).
****zetetis*** Hood, 1936*d*: 432–6. Holotype ♂, Peru (USNM).

HARTWIGIA Faure

(Figs 268, 283, 294, 304)

Hartwigia Faure, 1949*b*: 208–10. Type-species: *Hartwigia tumiceps* Faure, by monotypy.

Faure compared this genus to *Docessissophothrips*, although the only known species has broad maxillary stylets (Fig. 268) and the antennae bear four sense cones on segment III. Priesner (1961) placed the genus in the Compsothripini, and Stannard (1976) erected a monobasic subtribe 'Hartwigia'. This family-group name is rejected here on the grounds that it is incorrectly formed. *Hartwigia* is recognised as related to *Elaphrothrips* because of the two pairs of wing-retaining setae on each tergite (Fig. 294) and the complete absence of metathoracic sternopleural sutures. The ant-like body form is not unlike that of some *Ophthalmothrips* species, and the fore femora of the males bear a group of stout setae on the external margin basally.

Species included
tumiceps Faure, 1949*b*: 210–2. Holotype ♂, South Africa (NCIP).

LAMILLOTHRIPS Bagnall

(Figs 275, 312)

Lamillothrips Bagnall, 1923: 630–1. Type-species: *Lamillothrips typicus* Bagnall, by monotypy.
Hylothrips Priesner, 1932: 336. Type-species: *Hylothrips aethiopicus* Priesner, by original designation. **Syn. n.**

The five African species which have been placed in these two genera remain very poorly known. There is no doubt that the species are congeneric, the male holotype of *vitulus* and a female paratype of *aethiopicus* having been compared with the type-material of Bagnall's three species. There is so little difference between these few available specimens that they may, in fact, represent only a single variable and widespread species. If this should prove to be so, then *Lamillothrips* itself may best be regarded as a synonym of *Elaphrothrips* in view of the few differences by which it may be distinguished. *Machatothrips*, to which *Lamillothrips* has previously been compared, belongs in the Macrothripina.

SPECIES INCLUDED

aethiopicus (Priesner, 1932: 337–9) (*Hylothrips*). Holotype ♂, CONGO (MRAC). **Comb. n.**
typicus Bagnall, 1923: 631. Lectotype ♂, GHANA (BMNH).
pennicollis Bagnall, 1923: 631. Holotype ♂, GHANA (BMNH).
longidens Bagnall, 1934*a*: 491–2 (*Machatothrips*). Holotype ♂, SIERRA LEONE (BMNH).
vitulus (Karny, 1920*a*: 109–111) (*Macrothrips*). Holotype ♂, CAMEROUN (SMF).

MALESIATHRIPS Palmer & Mound

(Figs 273, 274, 280, 291, 292, 296, 305)

Malesiathrips Palmer & Mound, 1978: 196. Type-species: *Malesiathrips malayensis* Palmer & Mound, by original designation.

This genus, with three species from the Oriental and Pacific Regions, appears to be closely related to *Dermothrips* from Hawaii. They differ in that *Malesiathrips* species bear a large seta on the dorsal surface of antennal segment II (Figs 291, 292) as in some species of Hystricothripina. The two genera are here included in the Elaphrothripina provisionally, because of their lack of metathoracic sternopleural sutures, and the presence of long, complete anapleural sutures (Fig. 280). Two species of *Malesiathrips* have two pairs of wing-retaining setae on each tergite (Fig. 296) although *solomoni* only has one pair.

SPECIES INCLUDED

guamensis Palmer & Mound, 1978: 196–8. Holotype ♀, GUAM (BMNH).
malayensis Palmer & Mound, 1978: 198–9. Holotype ♀, MALAYA (BMNH).
solomoni (Mound, 1970: 116–8) (*Atractothrips*). Holotype ♀, SOLOMON Is. (BMNH).

MECYNOTHRIPS Bagnall

(Figs 257–262, 287, 288, 297, 306)

Mecynothrips Bagnall, 1908*a*: 356. Type-species: *Mecynothrips wallacei* Bagnall, by monotypy.
Phoxothrips Karny, 1913*c*: 132. Type-species: *Phoxothrips pugilator* Karny, by monotypy.
Kleothrips Schmutz, 1913: 1057. Type-species: *Kleothrips gigans* Schmutz, by monotypy.
Dracothrips Bagnall, 1914*b*: 290. Type-species: *Dracothrips ceylonicus* Bagnall, by monotypy.
Acrothrips Karny, 1920*c*: 43. Type-species: *Acrothrips sorex* Karny, by monotypy.
Kleothrips (*Synkleothrips*) Priesner, 1935*a*: 330. Type-species: *Kleothrips* (*Synkleothrips*) *innocens* Priesner, by monotypy.
Kleothrips (*Akleothrips*) Priesner, 1935*a*: 332. Type-species: *Kleothrips* (*Akleothrips*) *karimonensis* Priesner, by original designation.

The generic synonymy listed above, also the structural variation shown by several species, has been discussed extensively by Palmer & Mound (1978: 200). The large number of names available has arisen because of earlier failures to recognise the variability of several species. The forefemora of large males, for example, often bear one or more large tubercles (Figs 287, 288), whereas the forefemora of small males of the same species are slender and lack tubercles. Similarly variable can be the position of the foreocellus (Figs 257–259), the form of the antennal setae, or even the number and position of the cheek setae on the head. Palmer & Mound (1978) recognised three species-groups in the genus: the *simplex*-group from East Africa to the Philippines and Japan; the *wallacei*-group from New Guinea, Australia and the Solomon Islands; and the *acanthus*-group from Java, Sumba and Australia. *Mecynothrips* is evidently

closely related to *Elaphrothrips*, which it replaces in the Old World Tropics east of Sulawesi. However, the remarkable presence of three pairs of major tergal wing-retaining setae (the anterior pair arises, close to the tergal antecostal ridge) suggests that *Mecynothrips* is the phylogenetic sister-group of the other Old World Elaphrothripina (Fig 297).

SPECIES INCLUDED

acanthus (Hood, 1918*a*: 77) (*Kleothrips*). Holotype ♂, AUSTRALIA (USNM).
serex Karny, 1920*c*: 43 (*Acrothrips*). Lectotype ♂, AUSTRALIA (SMF).
gargantua Girault, 1926: 1 (*Acrothrips*). Lectotype ♂, AUSTRALIA (QMB).
giganteus Girault, 1926: 4 (*Phoxothrips*). Holotype ♂, AUSTRALIA (QMB).
atratus (Hood, 1919*a*: 69) (*Kleothrips*). Holotype ♀, EAST AFRICA (USNM).
zuluensis Jacot-Guillarmod, 1939*a*: 70 (*Kleothrips-Akleothrips*). Holotype ♂, SOUTH AFRICA (AMG).
goliath (Priesner, 1935*a*: 327) (*Kleothrips*). Holotype ♂, SUMBA (SMF).
hardyi (Priesner, 1928*b*: 657) (*Kleothrips*). Holotype ♀, AUSTRALIA (SMF).
****kanoi*** (Takahashi, 1937: 343) (*Kleothrips*). Syntypes ♀, TAIWAN (unknown).
karimonensis (Priesner, 1935*a*: 332) (*Kleothrips-Akleothrips*). Holotype ♂, JAVA (SMF).
f. *parvidens* Priesner, 1935*a*: 334. Lectotype ♂, JAVA (SMF).
kraussi Palmer & Mound, 1978: 205–6. Holotype ♂, SOLOMON Is. (BMNH).
lacerta (Priesner, 1935*a*: 329) (*Kleothrips*). Lectotype ♀, SUMBA (SMF).
innocens Priesner, 1935*a*: 331 (*Kleothrips-Synkleothrips*). Holotype ♂, SUMBA (SMF).
priesneri Mound, 1971*b*: 281. Holotype ♂, New Guinea (BPBM).
minor Mound, 1971*b*: 282. Holotype ♂, NEW GUINEA (BPBM).
pugilator (Karny, 1913*c*: 132) (*Phoxothrips*). Holotype ♂, TAIWAN (unknown).
takahashii Priesner, 1935*c*: 372 (*Elaphrothrips*). Holotype ♀, JAPAN (SMF).
simplex Bagnall, 1912: 216. Holotype ♂, PHILIPPINES (BMNH).
gigans Schmutz, 1913: 1058 (*Kleothrips*). Syntypes ♂ ♀, SRI LANKA (NMV).
ceylonicus Bagnall, 1914*b*: 290 (*Dracothrips*). Syntypes ♂, SRI LANKA (lost).
agama Priesner, 1935*a*: 323 (*Kleothrips*). Holotype ♂, JAVA (SMF).
snodgrassi Hood, 1952*d*: 294. Holotype ♂, SOLOMON Is. (USNM).
taiwanus Okajima, 1979*b*: 127. Holotype ♂, TAIWAN (OCT).
wallacei Bagnall, 1908*a*: 357. Holotype ♂, NEW GUINEA (BMNH).
magnus Girault, 1929: 1. Syntypes ♂, AUSTRALIA (QMB).
bagnalli Priesner, 1935*a*: 335. Holotype ♀, KEI Is. (SMF).
f. *imbecilla* Priesner, 1935*a*: 338. Syntypes ♂ ♀, KEI Is. (SMF).

OPHTHALMOTHRIPS Hood

(Figs 264–267, 289, 302, 303)

Ophthalmothrips Hood, 1919*a*: 67. Type-species: *Ophthalmothrips pomeroyi* Hood, by monotypy.
Pyrgothrips Karny, 1924: 35–6. Type-species: *Pyrgothrips conocephalus* Karny, by monotypy. **Syn. n.**
Fulgorothrips Faure, 1933: 62–3. Type-species: *Fulgorothrips priesneri* Faure, by monotypy. [Synonymised with *Pyrgothrips* by Mound, 1974*a*: 89.] **Syn. n.**
Derothrips Jacot-Guillarmod, 1940: 133. Type-species: *Derothrips amyae* Jacot-Guillarmod, by monotypy. **Syn. n.**

This genus has not been recognised since its original description, although both Mound (1974*a*) and Haga (1975) have given an account of several species under the name *Pyrgothrips*. The recognition of species within the genus remains problematical, due to structural variation related to sex, morph and size, and particularly due to the rarity with which species have been collected in series. For example, several series collected recently in eastern Africa did not include macropterae and micropterae together at any one site. Not only is the variation within species poorly understood at present, but the range of form produces difficulties in defining the genus itself. In the holotype of *pomeroyi,* as well as in two macropterae from Malawi and two from Lourenco Marques, the foreocellus clearly overhangs the bases of the antennae (Fig. 267). However, this is not usually true of macropterae identified as *priesneri* (Fig. 264). The pelta is characteristically triangular throughout the genus except for *amyae* in which it is broadly rounded as in *Bolothrips* species (Figs 302, 303). The species of *Ophthalmothrips* are all small, with rather slender bodies and the eyes prolonged ventrally (Figs 264–7). They apparently all

live at the base of grass tussocks, and the genus appears to have been derived from small-bodied species of *Elaphrothrips* which have become specialised to this habitat. One undescribed species of *Elaphrothrips*, from grass tussocks in Tanzania, has been studied which has the general body form of *Ophthalmothrips* species but has small rounded eyes which are not prolonged ventrally. *O. amyae* is here interpreted as representing the extreme of a tendency within this group for the body to foreshorten, the head in particular being short and broad. The species *lesnei* (head production 103/50 to 60 μm) is very probably the same as *pomeroyi* (head production 110/57 μm). However, all the available names in the genus are listed separately below with no subjective synonymy in view of the differences of interpretation between Mound (1974*a*) and Haga (1975).

SPECIES INCLUDED

amyae (Jacot-Guillarmod, 1940: 135–8) (*Derothrips*). Holotype ♀, SOUTH AFRICA (AMG). **Comb. n.**
breviceps (Bagnall, 1914*c*: 380–1) (*Phoxothrips*). Holotype ♂, INDIA (BMNH). **Comb. n.**
conocephalus (Karny, 1924: 36) (*Pyrgothrips*). Holotype ♂, AUSTRALIA (NRS). **Comb. n.**
faurei (Ananthakrishnan, 1964*a*: 96) (*Fulgorothrips*). Holotype ♀, INDIA (TNA). **Comb. n.**
formosanus (Karny, 1913*c*: 130–1) (*Idolothrips*). Holotype ♀, TAIWAN (ZMB). **Comb. n.**
lesnei (Priesner, 1952*b*: 878) (*Fulgorothrips*). Holotype ♀, MOZAMBIQUE (MNHN). **Comb. n.**
longiceps (Haga, 1975: 270) (*Pyrgothrips*). Holotype ♀, JAPAN (MNHO). **Comb. n.**
miscanthicola (Haga, 1975: 273) (*Pyrgothrips*). Holotype ♀, JAPAN (MNHO). **Comb. n.**
pomeroyi Hood, 1919*a*: 67. Holotype ♀, EAST AFRICA (USNM).
priesneri (Faure, 1933: 63–5) (*Fulgorothrips*). Holotype ♂, SOUTH AFRICA (AMG). **Comb. n.**

TIAROTHRIPS Priesner

(Figs 269, 301)

Tiarothrips Priesner, 1935*a*: 251. Type-species: *Kleothrips subramanii* Ramakrishna, by monotypy.

The only species in this genus shares with *Dinothrips* (and some *Mecynothrips*) the position of the foreocellus just posterior to the major ocellar setae (Fig. 269). This may suggest that *Tiarothrips* and *Dinothrips* are sister-groups, and together constitute the sister-group of *Elaphrothrips, Lamillothrips* and *Ophthalmothrips*. The species *subramanii* is remarkable for the extreme allometry in the length of the preocular head process as well as the third antennal segment.

SPECIES INCLUDED

subramanii (Ramakrishna, 1925: 788) (*Kleothrips*). Holotype ♂, INDIA (? TNA).

Genera of Idolothripina

As used here, this group includes 10 genera and corresponds to the Megathripina of Priesner (1961) with the notable addition of *Meiothrips* and *Idolothrips*. The genus *Meiothrips* is closely related to *Bactrothrips*, females being allocated between these genera only with difficulty, and *Meiothrips* is also related to *Idolothrips*. Priesner, however, placed these genera with *Actinothrips* and related Neotropical genera with a slender body-form which are here treated in the Hystricothripina.

Males in the Idolothripina frequently bear tubercles (drepanae) laterally on the abdomen (Figs 324, 325). However, it must be emphasised that, despite this tendency, species lacking tubercles in the male are now known in both *Megathrips* and *Bactrothrips*. Similarly, the abdominal tube of Idolothripina species usually bears a number of distinct setae laterally (tube hairy), but these setae are sometimes decumbent or weakly developed. The metathoracic sternopleural sutures are not developed, as in the rest of the Idolothripini, but the metathoracic anapleural sutures (Fig. 327) tend to be shorter in the Idolothripina than in the Elaphrothripina and Hystricothripina.

Within the Idolothripina only one genus contains more than 10 species; this is *Bactrothrips* which is widespread throughout the Old World Tropics. *Megathrips* is a Holarctic derivative of

Bactrothrips from which it can only be distinguished by the superficial characteristic of the rather shorter head with maxillary stylets more deeply retracted (Fig. 321). Similarly, *Ceuthothrips* appears to be a Neotropical, monobasic, derivative of *Megathrips*. In contrast *Meiothrips* and *Idolothrips* are the eastern Oriental and Australian derivatives of *Bactrothrips*, and *Cylindrothrips* with one species from South Africa may also be related. *Bacillothrips* and *Megalothrips* appear quite distinct from the other genera in the Idolothripina (except possibly *Lasiothrips*) in having the maxillary stylets greatly elongate and close together in the middle of the head. These genera are normally regarded as Holarctic, but a new species of *Megalothrips* is described below from Malaya. However, elongation of the maxillary stylets is undoubtedly polyphyletic, possibly an adaptation to feeding on fungal spores in more confined situations. For example, the genus *Zeuglothrips* alone amongst the Hystricothripina has elongate stylets.

BACILLOTHRIPS Buffa

(Figs 315, 330)

Bacillothrips Buffa, 1908: 385–6. Type-species: *Bacillothrips linearis* (now regarded as a synonym of *Megalothrips longiceps* Reuter), by monotypy.

This genus is usually treated as monobasic, including just the Mediterranean species *longiceps*. However, the present authors consider that both *Megathrips nobilis* and *Docessissophothrips longiceps* should also be placed in *Bacillothrips*, and as a result the latter species is here renamed *bagnalli*. These three species have the head long and slender with the maxillary stylets deeply retracted and close together medially (Fig. 315). Moreover, the lateral lobes of the pelta are sharply cut off from the median lobe (Fig. 330), whereas these lateral lobes in *Megalothrips* species are more slender (Fig. 329). The metanotum of *longiceps* and *nobilis* has reticulate sculpture, whereas the sculpture on *bagnalli* is transverse. The head of *bagnalli* is clearly elevated in the mid line, although the heads of all three species appear to be essentially similar.

SPECIES INCLUDED

bagnalli **nom. n.** for *longiceps* Bagnall not *longiceps* Reuter.
  longiceps Bagnall, 1916: 407–8 (*Docessissophothrips*). Holotype ♀, MADEIRA (BMNH).
longiceps (Reuter, 1901: 215–6) (*Megalothrips*). Syntypes ♂, CORFU (unknown).
  linearis Buffa, 1908: 386–7. Syntypes ♀ ♂, ITALY; SARDINIA (unknown).
nobilis (Bagnall, 1909*b*: 130–1) (*Megathrips*). Lectotype ♂, ENGLAND (BMNH). **Comb. n.**

BACTROTHRIPS Karny

(Figs 314, 316, 332, 333)

Bactrothrips Karny, 1912*c*: 131. Type-species: *Bactrothrips longiventris* Karny, by monotypy.
Eidothrips Bagnall, 1918: 219. Type-species: *Eidothrips alluaudi* Bagnall, by monotypy. **Syn. n.**
Krinothrips Bagnall, 1918: 220. Type-species: *Krinothrips divergens* Bagnall, by monotypy. [Synonymised by Bagnall, 1921.]
Bactridothrips Karny, 1919: 116. Type-species: *Bactridothrips idolomorphus* Karny, by monotypy. **Syn. n.**
Caudothrips Karny, 1921*a*: 230. Type-species: *Caudothrips buffai* Karny, by monotypy. **Syn. n.**
Bactrianothrips Bagnall, 1936: 226–7. Type-species: *Bactrianothrips alluaudi* Bagnall, by monotypy. [Synonymised by Bournier, 1968: 157.]
Cervothrips Bagnall, 1936: 229. Type-species: *Cervothrips berlandi* Bagnall, by monotypy. **Syn. n.**

This group of genera was treated as a subfamily by Karny (1919). However, all of the genera are recognisable only from secondary sexual characters of the male abdomen; none of them can be recognised in the female sex. The primary characteristic of *Bactrothrips* is the presence in the males of a pair of long tubercles laterally on the sixth abdominal segment. From this condition the other genera have been defined as follows.

Bactrianothrips. A pair of truncate tubercules on VI; however, in the unique male holotype it is evident that these represent the bases of broken long tubercles.

Cervothrips. Elongate tubercles on VI forked; however Bournier (1968) demonstrated that, in small

males, one branch of the fork is scarcely developed. This suggests that the difference is of no more than specific value.

Eidothrips. Elongate tubercles on segments V and VI; only one species is known with this characteristic and, in view of the similarity of the females, there seems little advantage in segregating it to a separate genus.

Bactridothrips. Elongate tubercles on VI, also small tubercles on *either* or *both* of segments VII and VIII; this has been treated as a sub-genus by Bournier (1968) but in view of the variation it is not a useful segregate.

In addition to the variation indicated above, *Bactrothrips pitkini* sp. n. is described below from an apterous male *without any* abdominal tubercles. If the traditional generic concepts were accepted then *pitkini* would need to be placed in yet another new genus.

The spiracles of abdominal segment eight are elongate dorsoventrally in the males of *divergens* and *kenyensis* (Mound, 1968), but this is not true of the other available species. However, the validity of many species described from the African continent is in doubt, because so many are based on unique specimens or short series. Thus little or no account has been taken of allometric growth patterns in the abdominal tubercles of large and small males. Moreover, several species are based solely on females which cannot satisfactorily be associated with male specimens. Therefore, of the 39 available names in the genus, several are likely to be recognised as synonyms as soon as effective collecting is carried out. For this reason the homonymy of *alluaudi* Bagnall, 1918 with *alluaudi* Bagnall, 1936 is here allowed to stand until such time as the group can be re-examined comprehensively. It may not be entirely irrelevant to point out that the range of variation in the abdominal tubercles of male *Bactrothrips* species, as interpreted here, is no greater than that recognised in the *two species* of the genus *Idolothrips*.

The European species *buffai* and the Californian species *hesperus* are the only species placed in this genus from outside the Old World Tropics. These two species have rather shorter heads than the tropical species of *Bactrothrips*, and as a result the ocellar triangle is more nearly equiangular. However, the difference when measured is so slight that there seems no useful purpose in segregating the two species to separate genera. *Caudothrips* is therefore placed as a synonym of *Bactrothrips*. One unusual specimen has been studied from Japan with the eyes prolonged on the ventral surface of the head, a characteristic otherwise not found in *Bactrothrips* (although variable within *Ophthalmothrips* q.v. Elaphrothripina). The generic relationships of *Bactrothrips* are discussed under *Meiothrips* and *Idolothrips*.

SPECIES INCLUDED

alluaudi (Bagnall, 1918: 219–20) (*Eidothrips*). Lectotype ♂, KENYA (BMNH). **Comb. n.**
alluaudi (Bagnall, 1936: 227–8) (*Bactrianothrips*). Syntypes ♂ ♀, MADAGASCAR (MNHN: 2 ♀ BMNH).
aterrimus Priesner, 1936*a*: 213–4. Holotype ♂, UGANDA (BMNH).
****atrispinis*** Priesner, 1932: 220–1. Holotype ♀, ZAIRE (MRAC).
****bancoensis*** Priesner, 1952*b*: 867–8. Holotype ♀, IVORY COAST (MNHN).
berlandi (Bagnall, 1936: 229–30) (*Cervothrips*). Holotype ♂, CONGO (MNHN).
brevitubus Takahashi, 1935: 61–3. Holotype ♂, RYUKYU IS. (DART).
****bucculentus*** Bournier, 1968: 139–42. Holotype ♀, ANGOLA (MDA).
buffai (Karny, 1921*a*: 230) (*Caudothrips*). ITALY (types not designated). **Comb. n.**
  lesnei Bagnall, 1933*b*: 659–61 (*Megathrips*). Holotype ♂, ALGERIA (MNHN).
congoensis Priesner, 1932: 215–6. Syntypes ♂ ♀, ZAIRE (MRAC).
****delamarei*** Priesner, 1952*b*: 868–70. Holotype ♂, GUINEA (MNHN).
divergens (Bagnall, 1918: 220–1) (*Krinothrips*). Syntypes ♂ ♀, GHANA (BMNH).
  ritchianus Bagnall, 1932: 517–8 (*Actinothrips*). Holotype ♀, TANZANIA (BMNH).
****furcatus*** Priesner, 1932: 216–8. Syntypes ♂ ♀, ZAIRE (MRAC).
****grandis*** Priesner, 1932: 219–20. Holotype ♀, ZAIRE (MRAC).
****guineaensis*** Moulton, 1947*a*: 177–8. Holotype ♂, NEW GUINEA (CAS).
****guineensis*** Priesner, 1952*b*: 866–7. Holotype ♀, GUINEA (MNHN).
hesperus (Moulton, 1907: 65–6) (*Megalothrips*). Syntypes ♂ ♀, U.S.A.: California (CAS). **Comb. n.**
honoris (Bagnall, 1921*c*: 395) (*Megathrips*). Holotype ♂, JAPAN (BMNH). **Comb. n.**
****hoodi*** Bournier, 1968: 142–6. Holotype ♂, ANGOLA (MDA).
idolomorphus (Karny, 1919: 117–8) (*Bactridothrips*). Holotype ♂, MALAYA (SMF).
  serraticornis Bagnall, 1921*c*: 397 (*Bactridothrips*). Holotype ♂, SRI LANKA (BMNH).

*__inermis__ (Karny, 1912*c*: 138–9) (*Panurothrips*). Syntypes (sex not stated), Rio Muni ('Spanish Guinea') (unknown).
*__kawamurai__ (Ishida, 1932: 2–3) (*Idolothrips*). Holotype ♀, Japan (unknown). **Comb. n.**
kenyensis Priesner, 1935*b*: 129–30. Syntypes ♂ ♀, Kenya (BMNH).
laingi Bagnall, 1926: 558 (*Bactridothrips*). Holotype ♂, Sierra Leone (BMNH).
hargreavesi Bagnall, 1926: 555–6. (*Actinothrips*). Holotype ♀, Sierra Leone (BMNH).
*__lamottei__ Priesner, 1952*b*: 870–1. Holotype ♂, Guinea (MNHN).
*__levidens__ Priesner, 1932: 218–9. Holotype ♂, Zaire (MRAC).
*__longisetis__ Bournier, 1968: 154–7. Holotype ♀, Angola (MDA).
*__longiventris__ Karny, 1912*c*: 131–2. Holotype ♂, Rio Muni ('Spanish Guinea') (ZMB).
luteus Ananthakrishnan, 1973*b*: 81–4. Holotype ♀, India (TNA; 5 ♂ paratypes, BMNH).
*__macropteryx__ (Trybom, 1910: 523–5) (*Megalothrips*). Holotype ♂, Madagascar (MNHN).
malgassus Bournier, 1967: 1022–6. Holotype ♂, Madagascar (MNHN; ♀ ♂ paratypes BMNH).
moultoni (Bagnall, 1932: 513–4) (*Bactridothrips*). Holotype ♂, South Africa (BMNH).
natalensis Moulton, 1930: 415–6. Holotype ♂, South Africa (BMNH).
nativus (Girault, 1928*c*: 2) (*Idolothrips*). Holotype ♂, Australia (QMB).
*__nigripes__ Priesner, 1932: 212–3. Holotype ♂, Zaire (MRAC).
*__pallidicrus__ Priesner, 1952*b*: 871–2. Holotype ♀, Cameroun (MNHN).
***parvidens** Priesner, 1932: 213–4. Holotype ♂, Zaire (MRAC).
pitkini sp. n. Holotype ♂, Tanzania (BMNH).
priesneri Bournier, 1967: 1018–22. Holotype ♂, Madagascar (MNHN).
propinquus (Bagnall, 1936: 228–9) (*Bactridothrips*). Syntypes ♂ ♀, Congo (MNHN & BMNH).
quadrituberculatus (Bagnall, 1908*b*: 210–1) (*Idolothrips*). Holotype ♀, Japan (BMNH).
*__titschacki__ Bournier, 1968: 135–9. Holotype ♂, Angola (MDA).

Bactrothrips pitkini sp. n.

(Figs 314, 333)

Apterous ♂. Colour dark brown; antennal segments not bicoloured, III–IV yellow, V–VIII slightly darker; distal half of tibiae, basal half of hind femora and all tarsi yellow.

Head more than twice as long as wide (Fig. 314); slightly prolonged in front of eyes; dorsal setae well developed, cheeks with a few fine setae; maxillary stylets wide apart, retracted into head about half way to posterior margin of eyes.

Pronotal epimeral sutures weak; anteroangular setae small. Median metanotal setae well developed. Pelta with lateral lobes narrowly joined to median lobe (Fig. 333). Abdominal tergites II–VIII with one pair of small wing-retaining setae (anterior pair reduced or straight); lateral abdominal tubercles not developed; tube surface smooth but set with fine setae, tapering more strongly at apex, about 4·0 times as long as broad; setae B_1 on tergite IX 0·25–0·30 as long as tube.

Measurements (holotype ♂ in μm). Body length 4225. Head, length 520, maximum breadth 220; interocellar setae 70/74; postocellar setae 68/72; postocular setae I 70/74; postocular setae II 133/138. Pronotum length 233; breadth 333; major setae, am 54/62, aa 23/25, ml 72, pa 108/114, epim 100/106. Median metanotal setae 117/131. Tergite IX setae B_1 126/157. Tube, length 527; maximum breadth 134. Antennal segments III–VIII length, 290/295; 214; 176/181; 138/142; 90; 71.

Apterous ♀. Colour and structure similar to male. Setae B_1 on tergite IX longer, almost 0·5 times as long as tube. Tube longer, 5·5 times as long as broad, and 1·4 times as long as head.

Measurements (paratype ♀ in μm). Body length 4540. Head, length 520; maximum breadth 230; interocellar setae 67/68; postocellar setae 58/62; postocular setae I 74/76; postocular setae II 148/150. Pronotum, length 224; breadth 342; major setae, am 70/72, aa 24/36, ml 92/104, pa 134, epim 126/130. Median metanotal setae 168/172. Tergite IX setae B_1 369/372. Tube, length 728; maximum breadth 134. Antennal segments III–VIII length, 276/285; 204/209; 171; 135/138; 95/100; 71/74.

Macropterous ♀. Structure similar to apterous female, colour slightly darker. Abdominal tergites II–VII with two pairs of wing-retaining setae, anterior pair small. Wings pale, with a pale brown median line in basal half and 3 or 4 stout sub-basal setae.

Measurements (paratype ♀ in μm). Body length 5365. Head, length 543; maximum breadth 238; interocellar setae 68/75; postocellar setae 60/66; postocular setae I 66/75; postocular setae II 160/168. Pronotum, length 248; breadth 370; major setae, am 105, aa 34/38, ml 110/126, pa 144/149, epim 158. Median metanotal setae 190. Forewings, length 1728/1746; maximum breadth 194; number of duplicated

cilia 20/23. Tergite IX setae B_1 338/363. Tube, length 855; maximum breadth 143. Antennal segments III–VIII length, 309/314; 223/233; 185/190; 128/143; 90/95; 71/76.

SPECIMENS STUDIED

Holotype ♂ aptera, **Tanzania:** Pare Mountains, Gonja, in grass tussock at 1000 m, 16.vi.1974 (*B. R. Pitkin* 604) (BMNH).

Paratypes. 1 ♀ aptera taken with holotype; 1 ♀ macroptera with similar data, 13.vi.1974 (BMNH).

COMMENTS. This species is unique in the genus, not only in lacking lateral abdominal tubercles in the male, but also in the production of apterae. The apterae are smaller than the macroptera but retain well-developed ocelli. The metaepimera of the two morphs are essentially similar, but the tergal wing-retaining setae are reduced in the apterae. The lack of abdominal tubercles in the male, a characteristic which is usually diagnostic of this genus, finds a parallel in *Megathrips inermis* Priesner q.v. The description of *pitkini* includes separately the lengths of setae and antennal segments from the left and right hand sides of the body in order to emphasise the variation, and taxonomic problems associated with reliance on such characters.

CEUTHOTHRIPS Hood

(Figs 319, 328, 338)

Ceuthothrips Hood, 1938*c*: 406–7. Type-species: *Ceuthothrips timuqua* Hood, by monotypy.

This monobasic genus is known only from the type-series of six females and two males collected in Florida. The metathoracic sternite and epimera are typical of the Idolothripina, but, unlike other members of this group, both sexes bear a small foretarsal tooth. The head (Fig. 319) is similar to *Megathrips*, the pelta (Fig. 328) similar to *Megalothrips*, but the antennae have a curiously ill-formed, almost larval appearance (Fig. 338). The anterior pair of wing-retaining setae is not developed on the tergites, but this is probably a secondary reduction (as in *Megathrips*) associated with the evident reduction in length of the wings. *Ceuthothrips* is here considered to be a Neotropical derivative of the Holarctic genus *Megathrips*.

SPECIES INCLUDED

timuqua Hood, 1938*c*: 407–10. Holotype ♀, U.S.A.: Florida (USNM).

CYLINDROTHRIPS Moulton

(Figs 320, 335)

Cylindrothrips Moulton, 1949: 496. Type-species: *Cylindrothrips niger* Moulton, by monotypy.

This unusual monobasic genus was erected for a single male specimen collected in South Western Africa. However, the unique male holotype of *Derothrips turneri* Moulton from the same locality is here regarded as a larger specimen of the same species as *niger*. As first revisers, within the meaning of the *International Code of Zoological Nomenclature,* the present authors have placed *turneri* as a synonym of *niger* despite its page precedence. Moreover, the genus *Derothrips* is here treated as a synonym of *Ophthalmothrips* q.v.

The original illustrations of the heads and pronota of both *niger* and *turneri* are inaccurate, although both specimens are severely damaged. Despite these illustrations, the ocellar and postocular setae of the specimens are essentially similar, and the median setae on the vertex of *niger* have simply been removed in mounting. The main difference between the specimens lies in the structure of the tube. In *turneri* the base of the tube bears laterally and dorsally numerous stout teeth arising from the margins of each sculptured reticle, whereas in the much smaller *niger* only a very few, small teeth are developed. This difference is here interpreted as being an expression of allometric growth.

The genus *Cylindrothrips* is similar to *Lasiothrips, Megalothrips* and *Ceuthothrips* in having the pronotum transverse. However, unlike *Megalothrips* the pronotal midlateral setae are well separated from the anteroangulars, and moreover, the basal sculpture of the tube resembles that of *Idolothrips dissimilis* and *Meiothrips nepalensis*. The head (Fig. 320) and antennae of

Cylindrothrips niger are reminiscent of *Ophthalmothrips* species; however, the anapleural suture is short and the anterior border of the anepisternum almost entire as in the other members of the Idolothripina.

SPECIES INCLUDED
niger Moulton, 1949: 496–8. Holotype ♂, SOUTH WEST AFRICA (BMNH).
turneri Moulton, 1949: 494–6 (*Derothrips*). Holotype ♂, SOUTH WEST AFRICA (BMNH). **Syn. n.**

EGCHOCEPHALOTHRIPS Bagnall **gen. rev.**

Egchocephalothrips Bagnall, 1916: 408. Type-species: *Docessissophothrips monstrosus* Bagnall, by monotypy.

Although treated as a synonym of *Docessissophothrips* by Mound (1968), this genus is here accepted as valid. It is based on a single damaged specimen (?♀) which lacks the abdominal tube as well as the distal antennal segments. However, the metathoracic sternopleural sutures are not developed, the anapleural sutures are short and incomplete, the praepectus well developed, the maxillary stylets are deeply retracted and parallel medially in the head, the anteocellar pair of setae are elongate, the pelta has slender lateral wings, the median metanotal setae are very stout, the tergites have two pairs of wing-retaining setae with one or more additional setae directed mesad, and there are two sense cones on antennal segment III and four on segment IV. These characters are all shared with *Megalothrips*. The pronotum of the unique holotype is very short (correlating with the exceptional dorsal elevation of the head) and the fact that the pronotal sutures are complete may be due to cover-slip pressure. Both this genus and *Lasiothrips* (q.v.) may eventually prove to be synonyms of *Megalothrips*.

SPECIES INCLUDED
monstrosus (Bagnall, 1909*c*: 538–9) (*Docessissophothrips*). Holotype ?♀, NEW CALEDONIA (BMNH).

IDOLOTHRIPS Haliday

(Figs 317, 325, 334)

Idolothrips Haliday *in* Walker, 1852: 1096. Type-species: *Idolothrips marginatus* Haliday (now regarded as a synonym of *Idolothrips spectrum* Haliday), by subsequent designation, Bagnall, 1908: 356.
Acanthinothrips Bagnall, 1908: 207. Type-species: *Idolothrips spectrum* Haliday, by monotypy.

Froggatt (1904) demonstrated that the species *spectrum* Haliday is not only sexually dimorphic, but that the males exhibit a wide range of variation in the size and the number of the lateral tubercles and their setae depending on the overall body size. This variation is not always bilaterally symmetrical (Mound, 1968: fig. 55), and is complicated by the fact that long tubercles bear short stout setae whereas short tubercles bear long slender setae. This variation is reflected in the number of available names for *spectrum*.

The two species currently placed in *Idolothrips* are both known only from Australia (Mound, 1974*a*). However, the females of these species, also the head and thorax of the males, are very similar to species of *Meiothrips* and *Bactrothrips*, and no reliable characters for distinguishing between these genera have been found apart from those given in the key. The base of the tube in male *I. dissimilis* is similar to that of *Meiothrips nepalensis* in having a paired row of recurved tubercles dorsally and numerous small teeth laterally (Fig. 325), and the relationships of these genera are further discussed under *Meiothrips*. The tube of male *Cylindrothrips* is also similar but shorter.

Jacot-Guillarmod (1978) retains *halidayi* Newman, 1855 under *Idolothrips*; however, this species would be known more conveniently as *Gigantothrips halidayi* (Newman) **comb. n.** (Phlaeothripinae). The two species currently remaining in *Idolothrips* have been keyed by Mound (1974*a*).

SPECIES INCLUDED
dissimilis Girault, 1927*a*: 2. Holotype ♂, AUSTRALIA: Queensland (QMB).
spectrum Haliday *in* Walker, 1852: 1097. ? Syntypes ♂, NEW HOLLAND (depository unknown).

marginata Haliday *in* Walker, 1852: 1097. ? Syntypes ♂, NEW HOLLAND (depository unknown).
lacertina Haliday *in* Walker, 1852: 1097. ? Syntypes ♂, NEW HOLLAND (depository unknown).
marginatus f. invalida Priesner, 1928: 654. ? Syntypes ♂, AUSTRALIA: Queensland (SMF).
lacertinus f. *infirma* Priesner, 1928: 654. ? Syntypes ♂, AUSTRALIA: Queensland (SMF).
terrigena Girault, 1928*c*: 2 ? Syntypes ♂, AUSTRALIA: Queensland (QMB).
fasciatipennis Girault, 1930: 1. ? Syntypes (? ♂, sex not stated), AUSTRALIA: Queensland (QMB).
kellyanus Bagnall, 1932: 518–9. Holotype ♀, AUSTRALIA: South Australia (BMNH).

LASIOTHRIPS Moulton

(Fig. 322)

Lasiothrips Moulton, 1968: 121. Type-species: *Lasiothrips perplexus* Moulton, by monotypy.

This monobasic genus is based on a single male specimen from Australia. The maxillary stylets of this specimen are about one-third of the head width apart medially (Fig. 322), but since they are extended beyond the mouth cone by at least 100 μm it is possible that when at rest they might lie close together. Moreover, the epimeral sutures of this specimen are apparently complete but this could be an artefact due to coverslip pressure. If this pair of characters is disregarded then the specimen resembles a male *Megalothrips* which lacks abdominal tubercles. (Zoogeographical objections to this suggestion could be waived in view of the description below of *Megalothrips andrei* sp. n. from Malaya.) The pronotum of *perplexus* is short and wide; however, the lateral wings of the pelta are not exceptionally slender. Until further specimens are collected the relationships of *Lasiothrips* cannot be assessed. It cannot be distinguished satisfactorily from *Egchocephalothrips* on present evidence, although *monstrosus* has the head more strongly elevated in the mid-line with the two pairs of postocular setae arising side by side.

SPECIES INCLUDED
perplexus Moulton, 1968: 122–3. Holotype ♂, AUSTRALIA: Queensland (CAS).

MEGALOTHRIPS Uzel

(Figs 318, 324, 329, 337)

Megalothrips Uzel, 1894: 224–5. Type-species: *Megalothrips bonannii* Uzel, by subsequent designation, Bagnall, 1909*a*: 350.

This genus has been used for five species from the Holarctic Region, three North American and two European. In contrast, *andrei* sp. n., described below, was collected at Kuala Lumpur in Malaya. This extension in range is remarkable, but specimens of *Megalothrips* species have also been studied in the collection of Dr Shuji Okajima (Tokyo) which were collected in Japan (Kanagwa and Ohdaru) as well as in the Iriomote and Ishigaki Islands near Taiwan. Moreover, one specimen similar to *andrei* has been seen from Sumatra. Two further genera which are known only from single specimens, *Lasiothrips* from Australia and *Egchocephalothrips* from New Caledonia, may also prove to be synonyms of *Megalothrips* eventually.

Megalothrips species have the maxillary stylets deeply retracted into the head and close together medially (Fig. 318) as in *Bacillothrips*, but the pelta is characteristic with slender lateral lobes (Fig. 329).

The tube length is sexually dimorphic, being shorter in males than females. Moreover, in *andrei* sp. n., and to a lesser extent in *bonannii* but not in the other species, the tube of the female is longer than the head. The two European species *bonannii* and *delmasi*, together with *schuhi* from Oregon, U.S.A., form a closely related species-group in which antennal segment III is mainly yellow, IV and V have yellow pedicels, and even VI is pale basally. In contrast, *picticornis*, from the western U.S.A., has only the basal 0·75 of segment III yellow and the pedicel of IV slightly pale, whereas *spinosus,* which is widespread from Virginia to Washington State, U.S.A., has all the antennal segments dark. The new species, *andrei* from Malaya, differs from *picticornis* in the greater length of the tube, and in having the basal 0·8 or more of antennal segment III yellow but the pedicel of IV brown. Moreover, all the major setae on the body are

dark brown or black instead of light brown to colourless. Apart from these relatively superficial differences in colour and proportions the six species of *Megalothrips* are very similar to each other in structure.

SPECIES INCLUDED

andrei sp. n. Holotype ♂, MALAYA (BMNH).
bonannii Uzel, 1895: 227–8. Holotype ♂, CZECHOSLOVAKIA (depository unknown).
delmasi Bournier, 1956: 163–9. Holotype ♂, FRANCE (BCM; 2 ♀, 2 ♂ paratypes BMNH).
picticornis Hood, 1927*b*: 204. Lectotype ♀, U.S.A.: California (USNM).
animus Moulton, 1929*c*: 242–4. Holotype ♂, U.S.A.: California (CAS).
schuhi Crawford, 1947: 197–9. Holotype ♀, U.S.A.: Oregon (USNM).
spinosus Hood, 1908*b*: 306–7. Lectotype ♀, U.S.A.: Pennsylvania (USNM).
fuscus Watson, 1921: 84–5. Holotype ♀, U.S.A.: New York (FSAC).

Megalothrips andrei sp. n.

(Figs 324, 329, 337)

Macropterous ♂. Colour dark brown; antennal segment III pale, yellow, slightly darker in apical fifth; wings pale with pale brown median line in basal half. Head 2·3 times as long as broad; interocellar setae long, stout pair of setae on cheeks immediately behind eyes; postocular setae pair II long; maxillary stylets close together in centre of head, retracted to posterior margin of eyes. Pronotum short, about 3 times as broad as long; epimeral sutures weakly developed. Median metanotal setae well developed, longer than the distance between their bases. Wings with 3 sub-basal setae. Pelta with lateral lobes narrowly joined to median lobe (Fig. 329). Abdominal tergites II to VI with 2 pairs of well-developed sigmoid wing-retaining setae; tergite VI with a pair of tubercles laterally; setae B_1 on abdominal tergite IX about 0·5 times length of tube. Tube 3·6 times as long as broad, shorter than head, tapering more strongly at apex, set with stout dark setae (Fig. 324).

Measurements (holotype ♂ in μm). Body length 3744. Head, length 575; maximum breadth 248; interocellar setae 116/120; postocellar setae 42/46; postocular setae pair I 88/92; postocular setae pair II 164/241. Pronotum, length 124; width 364; major setae, am 116/46, aa 40/38, ml 97/76, pa 161/152, epim 184/216. Median metanotal setae 142/151. Wings, length 1630; maximum width 143; number of duplicated cilia 28/30. Tergite IX setae B_1 284/272. Tube, length 476; maximum width 119. Antennal segments III–VIII length, 152/157; 124/128; 128/133; 102/112; 69/71; 67/66.

Macropterous ♀. Colour and structure similar to ♂. Tergite VII with 2 pairs wing-retaining setae. Tube longer, about 5 times as long as broad and longer than head.

Measurements (2 ♀ paratypes in μm). Body length 4568 (5010). Head, length 632 (633); maximum width 296 (287); interocellar setae 135/140 (148/152); postocellar setae 56/48 (55/42); postocular setae pair I 67 (64/67); postocular setae pair II 135/137 (160/156). Pronotum, length 124 (133); maximum width 448 (422); major setae, am 38/43 (42), aa 31/34 (39), ml 53/54 (35/44), pa 113/143 (130/144), epim 171 (180/182). Median metanotal setae 103/128 (117/124). Wings, length 1727 (1872); maximum width 134 (172); number of duplicated cilia 27/30 (29/31). Tergite IX setae B_1 301/312 (315/332). Tube, length 729 (758); maximum width 147 (162). Antennal segments III–VIII length 176/181 (180/182); 143/147 (152); 147/152 (152/157); 114 (114/119); 62/64 (66); 71 (70/71).

SPECIES STUDIED

Holotype ♂, **Malaya:** Kuala Lumpur, on dead branches, 24.xii.1969 (*R. G. & Floyd Andre*) (BMNH).
Paratypes. 1 ♀ taken with holotype; 1 ♀ similar data except 29.xii.1969 (BMNH).

COMMENT. The specimen from Sumatra referred to above is much larger (head length 900 μm; tube length 1150 μm).

MEGATHRIPS Targioni-Tozzetti

(Figs 321, 326, 331)

Megathrips Targioni-Tozzetti, 1881: 124–5. Type-species: *Megathrips piccioli* Targioni-Tozzetti (now regarded as a synonym of *Phloeothrips lativentris* Heeger), by monotypy.
Siphonothrips Buffa, 1908: 389. Type-species: *Siphonothrips elegans* Buffa, by monotypy. **Syn. n.**

This genus, which is used here for six nominal species, appears to be a Holarctic derivative of the large genus *Bactrothrips* from the Old World tropics. The species in the two genera are

essentially similar, and can be distinguished only by the slightly larger head and more deeply retracted maxillary stylets of *Bactrothrips*.

The type-species, *lativentris*, is highly successful and widespread, but probably evolved from *Bactrothrips* through an earlier phase of wing-reduction. The forewings are pale; the anterior pair of wing-retaining setae on each tergite is reduced (Fig. 326); the pelta has the lateral lobes relatively broad rather than slender (Fig. 331); the head is foreshortened, less than 2·5 times as long as wide (Fig. 321). This constellation of characters suggests that *lativentris* has evolved from a micropterous or apterous ancestor, but has redeveloped the fully winged condition without redeveloping all of the characters associated with macroptery.

Five other species are placed in *Megathrips,* but of these both *elegans* and *timidus* are known only from their original descriptions. Moreover, *brevis* is known only from a single damaged male which has very short straight lateral tubercles on the sixth tergite and is smaller than any known male of *lativentris*. *M. flavipes* is the only member of the genus recorded from *Pinus* leaf litter. This species closely resembles the description of *timidus* in colour, having completely pale femora, but differs in the tube being shorter than the head. Finally, *inermis* is particularly interesting because, like *Bactrothrips pitkini* sp. n. described above, it lacks all trace in both sexes of the lateral abdominal tubercles usually regarded as diagnostic of this group of genera.

The genus *Siphonothrips* is here placed as a synonym of *Megathrips* because there is nothing in the description which can be used to distinguish between these taxa. The original figure of *elegans* is apparently of a dry, carded specimen. The head appears relatively broad and the abdomen shrunken, thus making the length of the tube and shape of the lateral tubercles as illustrated unreliable. Unfortunately, the original descriptions and illustrations of both *piccioli* and *lativentris* are also equivocal, and the concept of the type-species of *Megathrips* owes much to convention. The oldest available unequivocal name for this concept is *longispina* Reuter, and to ensure stability of the generic name it may become necessary to apply to the International Commission on Zoological Nomenclature to have *longispina* declared the type-species of *Megathrips*.

SPECIES INCLUDED

brevis (Bagnall, 1914*b*: 291–2) (*Siphonothrips*). Holotype ♂, YUGOSLAVIA (BMNH).
****elegans*** (Buffa, 1908: 389–90) (*Siphonothrips*). Holotype ♂, SARDINIA (depository unknown). **Comb. n.**
flavipes (Reuter, 1901: 216) (*Cryptothrips*). Syntypes ♀, CRETE (depository unknown).
inermis Priesner, 1937*a*: 348–50. Holotype ♂, SARDINIA (DEI).
lativentris (Heeger, 1852*b*: 479) (*Phloeothrips*). Syntypes ♂, AUSTRIA (depository unknown).
longispina Reuter, 1879: 214–5 (*Phloeothrips*). Holotype ♂, SWEDEN (depository unknown).
tibialis Reuter, 1879: 215–6 (*Phloeothrips*). Holotype ♀, SWEDEN (depository unknown).
piccioli Targioni-Tozzetti, 1881: 124–5. Syntypes ♀, ITALY (depository unknown).
niger Schmutz, 1909: 346–7 (*Megalothrips*). Holotype ♀, RUMANIA: Herkulesbad (depository unknown).
padewiethi Karny, 1919: 114–5 (*Bacillothrips*). Syntypes ♂ ♀, YUGOSLAVIA: 'Kroatischen Littorale' (?SMF).
****timidus*** Cott, 1956: 177–9. Holotype ♀, U.S.A.: California (depository unknown).

MEIOTHRIPS Priesner

(Figs 313, 323, 327, 336)

Idolothrips (*Meiothrips*) Priesner, 1929*b*: 197. Type-species: *Idolothrips* (*Meiothrips*) *annulatus* Priesner (now regarded as a synonym of *Acanthinothrips annulipes* Bagnall), by monotypy.
Meiothrips Priesner; Bagnall, 1934: 494. [Raised to genus.]
Meiothrips (*Aculeathrips*) Kudo, 1975: 421. Type-species: *Meiothrips* (*Telothrips*) *nepalensis* Kudo & Ananthakrishnan, by monotypy. [Replacement name for *Meiothrips* (*Telothrips*) Kudo & Ananthakrishnan, 1974: 385 nec *Telothrips* Priesner, 1929*a*.] [Synonymised by Palmer & Mound, 1978.]

This genus, which is used for three species found between Borneo, Thailand and India, has been redefined by Palmer & Mound (1978). Each of these species could be placed in a separate monobasic genus, as also could the two species of *Idolothrips*, if the generic concepts traditional-

ly employed in the *Bactrothrips* complex were accepted. However, the *Meiothrips* species are intermediate between *Idolothrips* and *Bactrothrips* both structurally and zoogeographically, and a series of monobasic genera would obscure this important relationship. Palmer & Mound (1978: 212) refer to a small male of *nepalensis* from Thailand with the metanotal setae short as in *Idolothrips*. These authors also point out that the ornamentation of the tube in the males of *M. nepalensis* and *I. dissimilis* is very similar, and that the females in these genera are difficult to separate from some females of *Bactrothrips*. In all three genera the anapleural sutures are short and straight.

SPECIES INCLUDED

annulipes (Bagnall, 1914*c*: 378–9) (*Acanthinothrips*). Lectotype ♂, SARAWAK (BMNH).
 annulatus Priesner, 1929*b*: 197–201 (*Idolothrips* subgen. *Meiothrips*). Syntypes ♂ ♀, SUMATRA (SMF; 1 ♂ BMNH).
menoni Ananthakrishnan, 1964*a*: 99–101. Holotype ♀, INDIA (TNA).
nepalensis Kudo & Ananthakrishnan, 1974: 385–7. Syntypes ♂ ♀, NEPAL (TNA, 2 ♂ BMNH).

Genera of Hystricothripina

Most of the genera placed in this subtribe in the present paper were listed by Priesner (1961) in the Idolothripina. However, as interpreted here, the Idolothripina comprises a group of predominantly old world genera characterised by the presence of well-developed praepectal plates, two pairs (or more) of tergal wing-retaining setae, well-developed forewing duplicated cilia, and a tendency for the males to bear one or more pairs of elongate tubercles or drepanae laterally on the abdomen. In contrast, the Hystricothripina (= Zeugmatothripina) comprises a group of predominantly new world genera characterised by the praepectal plates being absent or very weakly developed, the tergites usually bear only one pair of wing-retaining setae, the forewing duplicated cilia are absent or weakly developed, and there are no lateral drepanae on the male abdomen (although the posterolateral tergal setae usually arise on tubercles in both sexes).

Thirteen genera are recognised here in the Hystricothripina, of which eight, involving 33 species out of a total of 42, are found only in the Neotropics. These Neotropical genera appear to fall into two major groupings: the *Actinothrips*-group (including *Hybridothrips* and *Zactinothrips*) of 14 species, and the *Zeugmatothrips*-group (including *Azeugmatothrips, Cyphothrips, Saurothrips* and *Zeuglothrips*) of 19 species. Stannard (1954: 72) included these genera as subgenera of *Actinothrips*, and it may be that there are too many genera for the number of species involved. This phenomenon is not unusual when species differ from each other in very obvious, rather than somewhat subtle, characters. One of our colleagues has written to say that he would classify the group mainly on the number of elongate setae on the dorsal surface of the head. However, in this group there are three pairs of dorsal setal-bases – postocellars, postoculars and mid dorsals. Each of these may bear long or short setae, and, moreover, their position is also variable. In the opinion of the present authors, the size and position of these setae, *in this group*, are so variable that they are probably under relatively simple genetic control, and are poor indicators of phyletic relationships. This suggestion may apply also to the foretarsal tooth (absent in females) and forewing duplicated cilia in this group, as these characters are developed in a variety of different combinations in different species with no apparent evolutionary trend.

The five genera of Hystricothripina found outside the Neotropics are more diverse. *Hystricothrips*, with two species from western Africa, is most closely related to the Neotropical genera, whereas *Atractothrips*, with two species from Florida and Mexico, is similar to the Oriental genera in having a pair of stout pre-ocellar setae. These Oriental genera, *Holurothrips*, with three species, and the two monobasic genera described below, *Neatractothrips* and *Paractinothrips*, constitute a unique group in which the mesopraesternum is transverse, parallel-sided and apparently continuous with the sclerites laterally. In contrast, the rest of the Hystricothripina are remarkable in having the mesopraesternum reduced to a small *median* sclerite, whereas the rest of the Phlaeothripidae have a boat-shaped mesopraesternum which is frequently reduced to two small lateral triangles.

ACTINOTHRIPS Bagnall

(Figs 345, 353)

Actinothrips Bagnall, 1909*d*: 332–333. Type-species: *Actinothrips longicornis* Bagnall, by monotypy.
Dasythrips Hood, 1937*c*: 521–522. Type-species: *Dasythrips regalis* Hood, by monotypy. **Syn. n.**

The type-species of this genus, *longicornis* Bagnall, was described from a single dry specimen. Mound (1968) stated that only the tube of this specimen survived, mounted on a microscope slide, but subsequently the rest of the specimen was discovered dry in a glass vial at the British Museum (Natural History). This holotype, however, is a male, not a female, as can be deduced from the original illustration by Bagnall of the short, stout setae on tergites VII and VIII. Moreover, there is a *lapsus* in the original description, because it is the *meso- and metasterna*, not the 'meso and metascutum' which are 'rather closely set with numerous short hairs'.

Hood was never able to study the type-species of *Actinothrips*, and in fact *longicornis* is very similar to a major male of *Dasythrips regalis* in having a pair of forwardly directed tubercles on tergite III and a pair of stout metanotal setae arising from tubercles, as well as densely hairy thoracic sternites. Moreover, a large paratype of *Actinothrips femoralis* bears as many setae ventrally as a small paratype of *Dasythrips fraterculus*. For these reasons *Dasythrips* is here regarded as a synonym of *Actinothrips*. Moreover, the description of *D. chiapensis* from Mexico does not distinguish this species satisfactorily from the female of *A. trichaetus* from Panama.

Actinothrips is mostly closely related to *Zactinothrips*, although both in that genus and in *Hybridothrips* the eighth abdominal segment is elongate, twice as long as wide. Duplicated cilia are present on the forewing in species of all three genera; however, in only three species of *Actinothrips* does the male bear a foretarsal tooth: *femoralis*, *gargantua* and *pedalis*. This presence of a foretarsal tooth in these species is remarkable because *femoralis* and *polychaetus* appear to be closely related in having numerous stout setae on the inner margin of the male forefemora, although *polychaetus* lacks a foretarsal tooth. Moreover, females of *pedalis* are similar to females of *bondari*.

Allometry and sexual dimorphism in *Actinothrips* species, together with the few specimens available for study, make species delineations unsatisfactory at present. One species-group includes six nominal species which are distinguished mainly on characters associated with size. In decreasing order of body size these are: *regalis* (Peru), *longicornis* (Venezuela), *fraterculus* (Peru), *chiapensis* (Mexico), *trichaetus* (Panama, Trinidad, Ecuador), *bondari* (Brazil). The first five species have three major setae in an obliquely transverse row near the apex of the forefemora in both sexes. However, in *bondari* there is only one large seta, on the inner apical margin, and two smaller setae dorsally and externally. The apices of the tibiae are dark in the larger species, paler in *bondari*, but yellow in *pedalis*. Despite the similarity between the females of these last two species the males are readily distinguished by the bulbous femora of *pedalis*, an unusual characteristic in *Actinothrips*. Finally, the females of *monochaetus*, although individually larger than *bondari* females, have a single major seta apically on the forefemora, but the males are unusual in having all three pairs of posteroangular setae on tergite VIII short and stout.

SPECIES INCLUDED

bondari Hood, 1928: 147–150. Holotype ♀, BRAZIL (USNM).
*****chiapensis*** (Johansen & Garcia, 1976: 235–241) (*Dasythrips*). Holotype ♀, MEXICO (UNAM). **Comb. n.**
femoralis Hood, 1950: 5–9. Holotype ♀, BRAZIL (USNM; ♂ ♀ paratypes BMNH).
fraterculus (Hood, 1941: 236–240) (*Dasythrips*). Holotype ♂, PERU (USNM; ♂ ♀ paratypes BMNH). **Comb. n.**
gargantua Santis, 1960: 57–60. Holotype ♂, BRAZIL (MLPA).
longicornis Bagnall, 1909*d*: 333–334. Holotype ♂, VENEZUELA (BMNH).
monochaetus Hood, 1935*c*: 252–254. Holotype ♀, GUYANA (BMNH).
pedalis Hood, 1949: 76–78. Holotype ♀, BRAZIL (USNM; ♂ ♀ paratypes BMNH).
*****polychaetus*** Hood, 1941: 221–223. Holotype ♂, VENEZUELA (USNM).
regalis (Hood, 1937*c*: 522–527) (*Dasythrips*). Holotype ♂, PERU (USNM). **Comb. n.**
trichaetus Hood, 1935*c*: 248–252. Lectotype ♀, PANAMA (USNM; ♂ ♀ paralectotypes BMNH).

ATRACTOTHRIPS Hood

(Fig 346)

Atractothrips Hood, 1938*a*: 27–28. Type-species: *Atractothrips bradleyi* Hood, by monotypy.

Two Oriental species described in this genus are now placed in *Neatractothrips* and *Malesiathrips* q.v. The two remaining species are found in Mexico, and in Florida and the extreme south-east of Georgia, U.S.A. They have a combination of characters which are intermediate between those of Neotropical and Oriental Hystricothripina. Antennal segments I and II bear large dorsal setae, moreover III is shorter than IV as in *Zeugmatothrips*, but in contrast VIII is short and stout instead of lanceolate. The head has stout cheek setae, and the maxillary stylets are wide apart (Fig. 346), but the preocellar setae are enlarged as in the Oriental members of the group. The praepectus and mesopraesternum are absent, and the mesothoracic epimeral setae well developed, but the metanotal setae and forewing sub-basal setae are very small in *bradleyi* (although longer in *mockfordi*), and the lateral setae of tergite I arise anterior to the lateral lobes of the pelta. The abdominal tergites bear two pairs of wing-retaining setae, although the anterior pair is straight, not sigmoidal, and the tergal posterolateral angles are produced into two pairs of tubercles. Unlike the Neotropical species, the tube is long with the lateral setae short and sparse. *Atractothrips* appears to represent the sister-group of the three Oriental genera *Holurothrips*, *Neatractothrips* and *Paractinothrips*.

SPECIES INCLUDED

bradleyi Hood, 1938*a*: 28–32. Holotype ♂, U.S.A.: Florida (USNM; ♂ ♀ paratypes BMNH).
****mockfordi*** Stannard, 1974: 45–8. Holotype ♀, MEXICO (INHS).

AZEUGMATOTHRIPS gen. n.

(Figs 349, 357, 374, 382)

Type-species: *Azeugmatothrips rectus* sp. n.

Antennal segments III–IV with 2 stout dorsal setae, I and V with one stout dorsal seta, III shorter than IV. Head with 3 pairs of major dorsal setae (postocellars elongate); maxillary stylets wide apart. Pro-, meso- and metanota similar to *Zeugmatothrips*; foretarsus of ♂ with a stout tooth; forewing with duplicated cilia. Pelta bearing two pairs of setae laterally; tergites with one pair of wing-retaining setae; tube with lateral setae long and erect.

The two species in this new genus appear to be derived from *Zeugmatothrips*. The antennae, with segment III short and VIII lanceolate, also the pelta, are similar to that genus. Moreover, the mesothoracic epimeral setae and the mesonotal lateral setae are elongate as in *Saurothrips*, and the postocellar setae are elongate as in *Saurothrips*, *Zeuglothrips* and *Hybridothrips*. However, this combination of characters, together with the forewing bearing duplicated cilia, and the male with a foretarsal tooth, is found only in the two species treated below. One of these, *obrieni*, was described in *Zeuglothrips* because of the similar head chaetotaxy although the type-species of that genus has the maxillary stylets very long and close together medially (Fig. 342). The new species, *rectus*, differs from *obrieni* in its much smaller size, in having two large setae on antennal segment II instead of only one, and in having four stout setae on each forefemora instead of about eight such setae.

SPECIES INCLUDED

obrieni (Johansen, 1975: 188–92) (*Zeuglothrips*). Holotype ♂, PANAMA (UNAM). **Comb. n.**
rectus sp. n. Holotype ♂, TRINIDAD (BMNH).

Azeugmatothrips rectus sp. n.

Macropterous ♂. Colour dark brown to black, mid- and hindtarsi also foretibiae paler; foretarsi and apices of foretibiae yellowish brown; antennal segment IV, V and stem of VI yellow, III with club pale but stem brown except for extreme base; dorsal setae on antennae, fore- and midfemora, also tergites VIII–IX, dark brown; major setae on vertex, pronotum and tergites II–VI pale or colourless; setae on tergite VII, also genal setae, shaded; forewing weakly shaded, with a median longitudinal dark line, sub-basal setae pale.

Head (Fig. 349) produced in front of rounded eyes; postocellar setae elongate, mid-dorsal setae arising between postoculars; cheeks with two pairs of stout setae; maxillary stylets wide apart; dorsal surface weakly sculptured with anastomosing lines. Antennae 8-segmented, VIII lanceolate, II–IV with 2 stout dorsal setae. I and V with one stout seta (Fig. 357); 2 sense cones on III, 4 on IV.

Pronotum (Fig. 349) transverse, aa and ml setae close together on a tubercle; epimeral sutures complete; pm setae minute; praepectus absent, mesopraesternum reduced to a small median sclerite. Forefemur with 4 stout setae; foretarsus with stout recurved tooth. Mesonotal mid-lateral and epimeral setae well developed. Metanotum reticulate, median setae stout. Metaepimeron moderately swollen, with one large seta. Forewing parallel-sided, curving forward distally, sub-basal setae well developed.

Pelta (Fig. 382) broad basally, bearing 2 pairs of setae; tergites II–VII with one pair of wing-retaining setae; lateral tergal setae well developed, II with 2 pairs, III with 3 pairs. Tube densely setose, setae long and erect (Fig. 374). Sternites with one row of discal setae, posteromarginal setae small.

Measurements (holotype ♂ in μm). Body length 4000 (extended). Head, total length 390; length in front of eyes 60; width behind eyes 230; major setae – postocellars 150, postoculars 190, mid-dorsals 110, genals 45–60. Pronotum, length 200; width 360; major setae – am 120, aa 180, ml 135, epim 165, pa 120. Mesonotal setae – midlaterals 60, epimerals 90. Metanotal median setae 130. Forewing, length 1700; distal width 90; sub-basal setae 120, 100, 140; number of duplicated cilia 9 (12). Tergite VI posteroangular setae B_1 260, B_2 180, B_3 230. Tergite IX setae, B_1 180, B_2 220, B_3 180. Tube, length 900; terminal setae 200; longest lateral setae 260. Antennal segments III–VIII length, 155, 180, 190, 130, 80, 110.

Specimens studied

Holotype ♂, **Trinidad:** Arima Valley, Simla, dead branch of *Anona,* 4.xi.1970 (*L. A. Mound,* 908).

Comments. This new species is unique in having the mid-dorsal head setae arising so far forward, in line with the postocular setae.

CYPHOTHRIPS Hood

(Figs 339, 352, 363, 384)

Cyphothrips Hood, 1952: 172. Type-species: *Cyphothrips dorsalis* Hood, by monotypy.

This monobasic genus appears to be a specialised derivative of *Zeugmatothrips*. The head, pronotum (Fig. 339), sternites and pelta (Fig. 384) are similar to species of that genus, although the ventro-lateral pale tubercles on the head are similar to those found in *Zactinothrips* q.v. The first antennal segment bears a stout dorsal seta, but segments II–V do not have any stout setae (Fig. 363), although this is also true of *Zeugmatothrips hoodi*. The main differences from *Zeugmatothrips* species are that the forewing bears 2 to 4 weak duplicated cilia, and the lateral setae on the tube are weak and decumbent. Moreover, in the male, the foretarsus bears a tooth, and the metanotal median setae are borne on a pair of elongate tubercles (Fig. 352).

Species included

dorsalis Hood, 1952: 172–173. Lectotype ♀, Brazil (USNM).

HOLUROTHRIPS Bagnall

(Figs 341, 354, 361, 383)

Holurothrips Bagnall, 1914*c*: 376. Type-species: *Holurothrips ornatus* Bagnall, by monotypy.

This genus, with three species between Japan, Malaya and Queensland, is placed in the Hystricothripina because of the following characters: antennal segment VIII lanceolate, segments I–II with stout dorsal setae (Fig. 361); head with 2 pairs of stout cheek setae; pronotal aa and ml setae arising close together (Fig. 341); mesothoracic epimeral setae present, although small; tergal posteroangular setae arising from small tubercles; tergite IX setae short; tube long with many short, widely spaced setae. *Holurothrips* resembles the Oriental genera *Neatractothrips* and *Paractinothrips*, and differs from the Neotropical genera in having praepectal plates, preocellar setae, a completely transverse mesopraesternum and reduced metanotal setae. In this genus the setae of the first abdominal segment arise close to the lateral extremities of the pelta (Fig. 383), the thoracic sternites bear numerous setae, and the abdominal sternites have two rows of discal setae. The most remarkable feature of the genus is the ventral

prolongation of the eyes (Fig. 341). Contrary to Mound (1974: 57) tergites IV–VI (sometimes also III) have three, not two, pairs of wing-retaining setae in *ornatus*. However, the closely related species *morikawai* has only two pairs of these setae.

SPECIES INCLUDED

collessi Mound, 1974: 58. Holotype ♀, AUSTRALIA: Queensland (ANIC).
morikawai Kurosawa, 1968: 55. Holotype ♀, JAPAN (NIAT).
ornatus Bagnall, 1914*c*: 376–377. Lectotype ♂, SARAWAK (BMNH).
leeuweni Priesner, 1934: 62–63. Syntypes ♂ ♀, JAVA (SMF; BMNH).

HYBRIDOTHRIPS Stannard

(Figs 340, 360)

Actinothrips (*Hybridothrips*) Stannard, 1954*b*: 71–74. Type-species: *Actinothrips* (*Hybridothrips*) *oneillae* Stannard, by monotypy.
Hybridothrips Stannard, 1957: 100–101. [Raised to genus.]

This genus appears to be derived, with *Zactinothrips* q.v., from *Actinothrips*. The heads are similar in the latter two genera, but the head shape of *Hybridothrips* is distinctive amongst Neotropical species in that the eyes are a little reduced and flattened (Fig. 340), much as in *Atractothrips*. There are three pairs of major dorsal setae on the head, as in *Zeuglothrips*, but the maxillary stylets are wide apart, the pelta does not bear setae laterally, and the pronotal pa setae are very small but the pm setae enlarged. The pronotum of *Zactinothrips* is intermediate in that both pa and pm setae are very small; however, the males of *Hybridothrips* and *Zactinothrips* are similar in having abdominal segment VIII much larger than in *Actinothrips*. Antennal segments III–IV bear supernumerary sense cones ventrally near the apex in *Hybridothrips* (Fig. 360), but both dorsally and ventrally in *Zactinothrips*, at least in the males. The holotype female of *guerreronsis* has been compared with the holotype male of *oneillae* and they are regarded as the same species. According to Dr Roberto Johansen (*in litt.*) this species is widespread in the *Quercus*/*Pinus* forests of Mexico at the transitional zone between the Neotropics and the Nearctic.

SPECIES INCLUDED

oneillae (Stannard, 1954*b*: 74) (*Actinothrips* subgenus *Hybridothrips*). Holotype ♂, MEXICO (USNM).
guerreronsis Johansen & Garcia, 1973: 55–61 (*Zeuglothrips*). Holotype ♀, MEXICO (UNAM). **Syn. n.**

HYSTRICOTHRIPS Karny

(Figs 344, 358, 370, 375)

Hystricothrips Karny, 1912*c*: 132. Type-species: *Hystricothrips phasgonura* Karny, by monotypy.
Zeugmatothripoides Bagnall, 1929: 71–72. Type-species: *Zeugmatothripoides africanus* Bagnall, by monotypy. [Synonymised by Mound, 1968: 124–125.]

This genus, from western Africa, appears to be the sister-group of the Neotropical Hystricothripina. It differs mainly in the heavily sculptured, and densely setose tube, and the lack of elongate setae on the metanotum and mesothoracic epimera. The forewings, when present, bear up to about 25 duplicated cilia, although these are very fine. In the male the foretarsus bears a stout tooth, and the posterolateral angles of the tergites are drawn out into tubercles (Fig. 370). Antennal segments III–VIII (Fig. 358) are similar to those of *Zeugmatothrips* species, the mesopraesternum is similarly reduced, but the postocellar setae are well developed (Fig. 344) and there are two pairs of wing-retaining setae in macropterae.

Contrary to Pitkin & Mound (1973) *africanus* can be distinguished from *phasgonura* as follows.

1 Antennal segment I with inner dorsal seta half as long as external dorsal seta; segment II with one dorsal seta more than half as long as segment III; ♂ with seta B_1 on tergite VII stout but rounded apically, setae B_1 and B_2 on VIII short and thorn-like [Sierre Leone, Ivory Coast, Nigeria, São Thomé] ***africanus***

– Antennal segment I with both dorsal setae extending beyond apex of II; segment II with no long dorsal setae; ♂ with B_1 on tergite VII thorn-like on a stout tubercle, but B_1 and B_2 on VIII setaceous (Zaire, Equatorial Guinea, Angola) .... ***phasgonura***

SPECIES INCLUDED

africanus (Bagnall, 1929: 72–73) (*Zeugmatothripoides*). Holotype ♀, SIERRA LEONE (BMNH).
phasgonura Karny, 1912*c*: 132–133. Holotype ♀, EQUATORIAL GUINEA (ZMB).
hystrix Priesner, 1932: 198–201. Holotype ♂, ZAIRE (MRAC).

NEATRACTOTHRIPS gen. n.

(Figs 372, 377)

Type-species: *Atractothrips macrurus* Okajima.

Antennae 8-segmented, I and II with dorsal setae enlarged, III longer than IV but without stout setae. Head elongate, prolonged in front of eyes with stout preocellar setae and cheek setae; maxillary stylets wide apart. Pronotum with epimeral sutures not quite complete; aa and ml setae close; praepectus present but reduced to a pair of small, setal bearing sclerites laterally. Foretarsus in both sexes without a tooth but with inner margin slightly raised; femora with several large setae. Mesothoracic epimeral setae well developed; mesopraesternum transverse, not clearly delimited from lateral sclerites (Fig. 372). Metanotal setae not elongate; metathoracic episterna moderately enlarged, anapleural sutures short. Forewings broad, without duplicated cilia. Lateral setae of abdominal segment I anterior to lateral lobes of pelta (Fig. 377); tergites III–V with 5 pairs of wing-retaining setae; tergites produced into 2 pairs of tubercles posterolaterally; setae on tergite IX very short; tube exceptionally long, marginal setae short and sparse; sternites with more than one row of discal setae.

This new monobasic Oriental genus is closely related to *Paractinothrips,* and, together with that genus and *Holurothrips*, constitutes the sister-group of *Atractothrips*. The holotype has an ill-defined foretarsal tooth, but this is not present in 14 ♀, 4 ♂ collected in the Philippines with the paratypes of *Paractinothrips peratus* q.v. The unusual structure of the mesopraesternum (Fig. 372) is similar to that found in *Holurothrips* and *Paractinothrips*, but quite different from that found in *Atractothrips* and the rest of the Hystricothripina. The three Oriental genera tend to have the tube longer and more sparsely setose, the tergites with more numerous wing-retaining setae, and the head with larger preocellar setae than their Neotropical counterparts.

The original description of *macrurus* states that the praepectus is absent. However, examination of the ventral surface of the holotype through the back of the slide mount, using a ×40 water immersion lens, has revealed the presence of two seta-bearing sclerites anterolateral to the probasisternum (Fig. 372). These sclerites, which are also present in the specimens from the Philippines, are here interpreted as praepectal plates because they appear to be homologous with the external parts of the praepectus of *Paractinothrips peratus* (Fig. 373), and because cervical sclerites do not usually bear setae.

SPECIES INCLUDED

macrurus (Okajima, 1975: 13–16) (*Atractothrips*). Holotype ♀, RYUKU Is. (OCT). **Comb. n.**

PARACTINOTHRIPS gen. n.

(Figs 347, 348, 355, 359, 369, 373, 378)

Type-species: *Paractinothrips peratus* sp. n.

Head with preocular projection and well-developed preocellar setae; postocellar, postocular and mid-dorsal setae elongate; cheek setae stout; maxillary stylets wide apart. Antennae 8-segmented; III shorter than IV; VIII slender; I with an elongate dorsal seta. Pronotal aa and ml setae fairly close; epimeral sutures not complete; praepectus present but weak. Both sexes without a foretarsal tooth; femora with several stout setae (Fig. 348). Mesopraesternum transverse; metanotal median setae not elongate; metathoracic episterna swollen, with a series of setae (Fig. 355); forewings slender, without duplicated cilia. Pelta broad with setae of abdominal segment I anterior to lateral lobes; tergites III–VII with 3 or 4 pairs of fan-shaped wing-retaining setae; posteroangular tergal setae arising from 2 pairs of tubercles; tergite IX setae short; tube elongate with many fine, semi-erect setae; sternites with more than one row of discal setae.

This new monobasic Oriental genus belongs in the Hystricothripina because of the form of the antennae and head (Figs 347, 359), the proximity of the pronotal aa and ml setae, the enlarged metathoracic anepisterna, the posterolateral tergal tubercles (Fig. 369),, and the long setose tube. The praepectus, which is absent in the Neotropical genera, is more fully developed than in *Neatractothrips*, although these two genera are similar in the structure of the mesopraesternum. *P. peratus* differs from *N. macrurus* most obviously in the form of the antennae with a short third segment, and in the slender wings.

Paractinothrips peratus sp. n.

Macropterous ♂. Colour brown with red internal pigment, tarsi paler; antennal segments III–VI and basal half of VII yellow; also apices of all tibiae yellow; major setae pale except on head and antennal segment I; small dorsal setae on antennal segments III–V dark brown; wings slightly shaded, with a very dark longitudinal median line.

Head prolonged in front of eyes; dorsal surface sculptured, bearing 2 rows of stout setae and 3 pairs of long setae (Fig. 347); maxillary stylets wide apart. Antennae 8-segmented, I with dorsal seta extending to apex of II; sense cones long and slender, 2 on III, 4 on IV; segment III shorter than IV, dorsal setae small, dark, but with apices expanded (Fig. 359).

Pronotum with complex sculpture; major setae, particularly epimerals, on tubercles (Fig. 347); praepectus weakly sclerotised (Fig. 373). Forefemur with at least 6 stout setae on tubercles, 1 or 2 of which are on inner margin (Fig. 348); foretarsus without a tooth. Mesonotum with 2 pairs of stout setae, similar in form to mesothoracic epimeral and metanotal median setae. Forewing with cilia arising unusually distant from wing margin.

Pelta with lateral wings, tergite I setae stout (Fig. 378); tergites with wing-retaining setae enlarged and fan-shaped; posterolateral tergal angles with 4 setae arising close together (Fig. 369); tergite IX setae very short, pair B_1 close together dorsally; tube long, apex constricted, lateral setae numerous and emerging at an angle of about 30°. Sternites IV–VI each with about 16 scattered discal setae, marginal setae not elongate.

Measurements (holotype ♂ in μm). Body length 4800 (extended). Head, total length 420; length of preocular process 60; maximum width behind eyes 210; dorsal setae – preocellar 30, postocellar 120, postocular 90, mid-dorsal 65, cheek setae 30. Pronotum, length 210; median width 300; major setae – am 30, aa 60, ml 40, epim 110, pa 60, pm 30. Mesothoracic epimeral seta 40. Forewing, length 1800; distal width 75; sub-basal setae 50, 45, 45. Metanotal median setae 40. Tergite V posteroangular setae B_1 110, B_2 90, B_3 60. Tergite IX setae B_1 50, B_2 50. Tube, length 1350; longest lateral setae 65; terminal setae 170. Antennal segments I–VIII length, 60 (seta 80), 50, 105, 170, 170, 115, 70, 40.

Macropterous ♀. With no significant difference from ♂.

Specimens studied

Holotype ♂, **Malaya:** Kuala Lumpur, on dead palm leaves, 29.xii.1969 (*R. G. & Floyd Andre*) (BMNH).

Paratypes. **Malaya:** 1 ♀ collected with holotype; 1 ♂ with similar data except 27.xii.1969; 1 ♀, Buklanyan, on dead branches, 26.xii.1971 (*Floyd Andre*) (BMNH). **Philippines:** Luzon, Quezon National Park, near Lucena City, 13 ♀, 18 ♂ on dead leaves of wild Palmaceae, 16.viii.1979 (*S. Okajima*) (BMNH & OCT).

Comments. The paratypes from the Philippines have the tibiae and antennal segment VI darker than the Malayan specimens. Moreover, the ratio antennal segment III/IV varies from 0·66–0·89 apparently independently of both sex and body size.

SAUROTHRIPS Hood

(Figs 343, 356, 368, 381)

Saurothrips Hood, 1952*c*: 171. Type-species: *Saurothrips assai* Hood, by monotypy.

The only species in this genus appears to be a specialised, long-bodied, derivative of *Zeugmatothrips*. However, the eighth abdominal segment is not elongate and narrowed medially as in *Zactinothrips* and to a lesser extent *Actinothrips*. *S. assai* has two stout setae on antennal segment II (Fig. 356), as well as the stout setae on segments I and III–V which are found in *Zeugmatothrips*. Moreover, the lateral setae on the tube are erect although rather short, and the

forewing bears no duplicated cilia. However, there is a stout foretarsal tooth in the male, and the postocellar setae are elongate (Fig. 343) as in *Zeuglothrips, Hybridothrips, Hystricothrips* and *Azeugmatothrips*. Unlike the other Neotropical Hystricothripina the metanotal setae and the forewing sub-basal setae are unusually short (50 μm), and tergites III–VI bear a second pair of wing retaining setae near the antecostal ridge.

SPECIES INCLUDED
assai Hood, 1952*c*: 171–172. Lectotype ♀, BRAZIL (USNM).

ZACTINOTHRIPS Hood

(Fig. 362)

Zactinothrips Hood, 1936*d*: 446–447. Type-species: *Zactinothrips elegans* Hood, by monotypy.

The most remarkable feature of this genus, the numerous small sense cones near the apex of antennal segments III and IV (Fig. 362), is also found in *Hybridothrips*, although in the latter genus these sense cones are only developed ventrally even in males. Moreover, in both these genera the forewings bear duplicated cilia and the male has a foretarsal tooth. However, the head of *Zactinothrips* resembles that of *Actinothrips* species, whereas the head of *Hybridothrips* has more than one pair of stout setae on the vertex as in the *Zeugmatothrips* group of genera. Despite the differences in the head chaetotaxy *Zactinothrips* from Peru and *Hybridothrips* from Mexico are probably sister-groups, and together constitute the sister-group of *Actinothrips*.

The number of small additional, antennal sense cones is sex-linked in *Zactinothrips*, but may also be subject to allometry and/or variation between populations. The available samples are not sufficient to provide firm evidence. In large males these sense cones are present on segments III, IV and V, although they are most numerous ventrally and there are fewer on V than on III. Small females may have no additional sense cones on the dorsal surface of IV and V, and even ventrally there are less than half as many as are found in males. The ventrolateral tubercles on the head, referred to by Hood, are also found in *Cyphothrips* and may be homologous with similar structures referred to as ommatidia by Mound (1974*a*; 1974*b*) in *Celidothrips* species and *Phacothrips ocelloides* (Hood) (Pygothripini).

Two species of *Zactinothrips* are known, both from Peru. The most common species, *elegans*, has the apical area of the third antennal segment dark brown, whereas in *modestus* this area is not darkened according to the original description.

SPECIES INCLUDED
elegans Hood, 1936*d*: 447–452. Holotype ♂, PERU (USNM).
****modestus*** Hood, 1941: 230–233. Holotype ♂, PERU (USNM).

ZEUGLOTHRIPS Hood

(Figs 342, 376)

Zeuglothrips Hood, 1936*d*: 452–453. Type-species: *Zeuglothrips echinus* Hood, by monotypy.

The type-species of this monobasic genus is unique in the Hystricothripina in having the maxillary stylets greatly elongate, retracted into the head as far as the eyes, and close together medially (Fig. 342). The postocellar setae are elongate as in *Hybridothrips* (also *Azeugmatothrips, Hystricothrips* and *Saurothrips*), but the pronotal posteroangular setae are elongate rather than the posteromedials as in *H. oneillae.* Antennal segments I–V bear enlarged dorsal setae in *Z. echinus*, and the pelta bears two setae laterally (Fig. 376) as in the *Zeugmatothrips* group of genera rather than the *Actinothrips*-group. Only two other species have been described in *Zeuglothrips*; *guerreronsis* is here transferred to *Hybridothrips* as a synonym of *oneillae*, and *obrieni* is transferred to *Azeugmatothrips*.

SPECIES INCLUDED
echinus Hood, 1936*d*: 453–457. Holotype ♀, PERU (USNM).

ZEUGMATOTHRIPS Priesner

(Figs 350, 351, 364–367, 371, 379, 380)

Zeugmatothrips Priesner, 1925*c*: 313. Type-species: *Zeugmatothrips hispidus* Priesner, by monotypy.

The 15 species described in this Neotropical genus exhibit a considerable range of variation, although most of them can be placed into one of two species-groups. The *cinctus*-group includes *borgmeieri, cinctus, gracilis, pallidulus* and *peltatus*. These five species have the mid-dorsal setae on the head relatively close to the postoculars (Fig. 350), antennal segments III–IV with two stout dorsal setae (Fig. 366), and the pelta reduced with the setae of the first abdominal segment on small sclerites laterally (cf. Fig. 380). The *priesneri*-group includes *annulipes, badiicornis, badiipes, femoralis, niger, mumbaca* and *priesneri*. These seven species have the mid-dorsal setae arising well posterior to the postoculars (Fig. 351), antennal segments III–IV with one stout dorsal seta (Fig. 364), and the setae of the first abdominal segment borne on the lateral lobes of the broad pelta (Fig. 379). The other three described species are intermediate between these two groups: *bispinosus*, according to the description, has the antennae of *cinctus*-group, but the head of *priesneri*-group; *hoodi* has the head and pelta of *priesneri*-group, but antennal segments III–IV each bear two *small*, pale dorsal setae (Fig. 367); *hispidus* has the pelta of *cinctus*-group (Fig. 380); the mid-dorsal setae small but distant from the postoculars, and antennal segments III–IV each with one long and one short, dark dorsal seta (Fig. 365). Moreover, the authors have studied a further species from Trinidad which differs from *hoodi* in being micropterous, with mid-femora pale, and tergites II and III with only one and two posteroangular setae respectively.

The genus *Zeugmatothrips* can be recognised by the form of the antennae with stout dorsal setae, short segment III and lanceolate segment VIII; also the absence of duplicated cilia on the forewing, the absence of a foretarsal tooth in both sexes, and the stout setose tube. The variation between species in the colour of the legs is remarkable, but as Hood (1949: 84–5) has pointed out these colours may be disruptive coloration associated with their habitat and sluggish habits.

Species included

annulipes Hood, 1941: 233–236. Holotype ♀, Peru (USNM; ♀ paratype BMNH).
****badiicornis*** Hood, 1936*d*: 457–460. Holotype ♀, Peru (USNM).
badiipes Hood, 1937*a*: 292–296. Lectotype ♀ Peru (USNM; ♀ paralectotype BMNH).
****bispinosus*** Hood, 1937*c*: 527–530. Holotype ♀, Peru (USNM).
borgmeieri Hood, 1949: 80–85. Holotype ♀, Brazil (USNM).
cinctus Hood, 1952*c*: 170–171. Lectotype ♀, Brazil (USNM: ♀ paralectotype BMNH).
****femoralis*** Hood, 1952*c*: 169. Holotype ♀, Brazil (USNM).
gracilis Hood, 1952*c*: 171. Syntypes ♂ ♀, Brazil (USNM).
hispidus Priesner, 1925*c*: 314–316. Holotype ♀, Mexico (SMF).
hoodi Priesner, 1927*b*: 189–192. Syntypes ♀, Costa Rica (SMF).
mumbaca Hood, 1952*c*: 169–170. Lectotype ♀, Brazil (USNM; ♂ ♀ paralectotypes BMNH).
niger Hood, 1952*c*: 168–169. Lectotype ♀, Brazil (USNM, ♀ paralectotype BMNH).
pallidulus Hood, 1958: 225–228. Holotype ♀, Brazil (USNM: ♀ paratype BMNH).
****peltatus*** Hood, 1949: 85–88. Holotype ♀, Brazil (USNM).
priesneri Hood, 1935*a*: 102–106. Holotype ♀, Panama (USNM; ♂ ♀ paratypes BMNH).

Taxa transferred from Idolothripinae to Phlaeothripinae

In the opinion of the present authors, several genera listed by Priesner (1961) in his subfamily 'Megathripinae' (= Idolothripinae) are not closely related phylogenetically to that group. In particular, a series of genera placed in the Cryptothripini by Priesner are here transferred to the Docessissophothripini in the Phlaeothripinae (Table 5). Moreover, the subtribe Apelaunothripina is here recognised as a distinct tribe and transferred to the Phlaeothripinae from the Idolothripinae. All of the species concerned have the stylets only moderately broad (i.e. about 5 μm), except for a few very large or extremely advanced forms (e.g. *Tropothrips*), and no member of the group has been found with large fungal spores in the abdomen. Some of the species treated here under *Holothrips* have been found to contain small fungal spores and even

pieces of fungal hyphae. It is here assumed that these two tribes represent independent evolutionary lines from fungus-feeding ancestors involving partial adaptation to the spore-feeding habit. Almost all of the species have the typical phlaeothripine characteristic of short, stout B_2 setae on tergite nine of the males. Both tribes are therefore assumed to have arisen independently from *Hoplandrothrips*-like ancestors in the Phlaeothripini which also had elongate maxillary stylets and stout maxillary guides.

Table 5 Genera transferred from Idolothripinae to Phlaeothripinae

- Tribe **APELAUNOTHRIPINI stat. n.**
  - ***APELAUNOTHRIPS*** Karny
    - *Baphothrips* Priesner
  - ***DEXIOTHRIPS*** Hartwig
- Tribe **DOCESSISSOPHOTHRIPINI**
  - ***ABIASTOTHRIPS*** Priesner
    - *Cratothrips* Priesner
  - ***ASEMOTHRIPS*** Hood **gen. rev.**
    - *Coenothrips* Bagnall **syn. n.**
    - *Eucoenothrips* Bagnall **syn. n.**
    - *Empresmothrips* Karny **syn. n.**
  - ***DOCESSISSOPHOTHRIPS*** Bagnall
    - *Polyphemothrips* Schmutz **syn. n.**
  - ***HOLOTHRIPS*** Karny
    - *Adelothrips* Hood **syn. n.**
    - *Agnostothrips* Moulton **syn. n.**
    - *Cordylothrips* Hood **syn. n.**
    - *Erythrinothrips* Ananthakrishnan **syn. n.**
    - *Holmiella* Zur Strassen **syn. n.**
    - *Ischnothrips* Moulton **syn. n.**
    - *Lathrobiothrips* Hood **syn. n.**
    - *Panceratothrips* Bagnall **syn. n.**
    - *Stinothrips* Ananthakrishnan **syn. n.**
  - ***MAXILLATA*** Faure **gen. rev.**
  - ***OIDANOTHRIPS*** Moulton
  - ***PONGOLA*** Zur Strassen
  - ***SYMPHYOTHRIPS*** Hood & Williams
    - *Mesopotamothrips* Liebermann & Gemignani
  - ***TROPOTHRIPS*** Hood **gen. rev.**

Tribe APELAUNOTHRIPINI stat. n.

The subtribe Apelaunothripina was erected by Priesner (1961: 288) for two genera in his tribe Megathripini. These genera were placed in 'Megathripinae' because of the moderately broad stylets. However, Priesner indicted that unlike all other members of that subfamily the males have setae B_2 on the ninth tergite short and stout. Because of these setae, and because no large fungal spores have been found in the gut and the maxillary stylets are only slightly broader than in typical phlaeothripines, Mound (1974*a*) treated *Apelaunothrips* in the Phlaeothripinae. This relationship was endorsed by Okajima (1979*a*), who indicated that the second genus, *Dexiothrips*, is closely related to *Apelaunothrips* despite the different arrangement of the maxillary stylets. At present the tribe can be defined as those Phlaeothripidae which have B_2 setae on tergite nine of the males short and stout but in which the maxillary stylets are relatively broad and the maxillary guides stout. In contrast to the Docessissophothripini, which also share these characters, the Apelaunothripini have long slender antennae with eight segments, and no metathoracic sternopleural sutures.

APELAUNOTHRIPS Karny

Apelaunothrips Karny, 1925*c*: 82. Type-species: *Ophidothrips medioflavus* Karny, by monotypy.
Baphothrips Priesner, 1933*b*: 69–70. Type-species: *Baphothrips tricolor* Priesner, by monotypy. [Synonymised by Mound, 1974*a*: 17.]

Nineteen Old World species are known in this genus, mostly from dead leaves in the eastern Oriental Region.

SPECIES INCLUDED

armatus Okajima, 1979*a*: 42–4. Holotype ♀, MALAYA (OCT).
bhowalii (Ananthakrishnan, 1972*a*: 183) (*Stigmothrips*). Holotype ♀, INDIA (TNA).
bicolor Okajima, 1979*a*: 44–6. Holotype ♀, THAILAND (OCT).
consimilis (Ananthakrishnan, 1969*a*: 173–4) (*Stigmothrips*). Holotype ♀, INDIA (TNA).
femoralis Okajima, 1979*a*: 48–9. Holotype ♀, SINGAPORE (OCT).
gabonensis (Bournier, 1970: 159–162) (*Baphothrips*). Holotype ♀, GABON (?BCM).
indicus (Ananthakrishnan, 1968*a*: 125–6) (*Philothrips*). Holotype ?♀, INDIA (TNA).
japonicus Okajima, 1979*a*: 49–50. Holotype ♀, JAPAN (OCT).

leios (Mound, 1970: 94–6) (*Baphothrips*). Holotype ♀, SOLOMON Is. (BMNH).
lieni Okajima, 1979*a*: 50–2. Holotype ♀, TAIWAN (OCT).
luridus Okajima, 1979*a*: 52–3. Holotype ♀, MALAYA (BMNH).
maculipennis (Okajima, 1976: 125–8) (*Stigmothrips*). Holotype ♀, OKINAWA Is. (OCT).
malayensis Okajima, 1979*a*: 54–6. Holotype ♀, MALAYA (OCT).
medioflavus (Karny, 1925*a*: 50–2) (*Ophidothrips*). Holotype ♀, JAVA (SMF).
montanus Okajima, 1979*a*: 57–9. Holotype ♀, JAPAN (OCT).
nigripennis Okajima, 1979*a*: 59–61. Holotype ♀, TAIWAN (OCT).
ocularis Okajima, 1979*a*: 61–2. Holotype ♀, MALAYA (OCT).
tasmani Mound, 1974*a*: 18–9. Holotype ♀, AUSTRALIA (ANIC).
tricolor (Priesner, 1933*b*: 70–2) (*Baphothrips*). Holotype ♀, JAVA (SMF).

DEXIOTHRIPS Hartwig

Dexiothrips Hartwig, 1952: 452. Type-species: *Dexiothrips pensus* Hartwig, by monotypy.

This genus has been discussed by Okajima (1979*a*) who transferred into it a second species.

SPECIES INCLUDED
madrasensis (Ananthakrishnan, 1964*b*: 109–10) (*Malacothrips*). Syntypes ♀ ♂, INDIA (TNA).
pensus Hartwig, 1952: 453–457. Holotype ♀, SOUTH AFRICA (NCIP).

Tribe DOCESSISSOPHOTHRIPINI

This tribe was erected by Karny (1921*a*: 257; as a subfamily) for the two genera *Docessissophothrips* and *Egchocephalothrips*, although the latter is here removed to the Idolothripina (p. 76). Nine genera are here placed in the tribe (*Abiastothrips, Asemothrips, Docessissophothrips, Holothrips, Maxillata, Oidanothrips, Pongola, Symphyothrips, Tropothrips*), although a further 15 generic names are placed in synonymy. The species in these genera share the following characters.

Antennae with segments VII–VIII more or less fused, III with three sense cones (two in *Asemothrips, Pongola, Symphyothrips*, four in *Oidanothrips*), IV with four sense cones (two in *Symphyothrips* and sometimes *Pongola*). Maxillary stylets moderately broad, retracted to compound eyes, usually parallel in middle of head but sometimes looped; maxillary guides stout. Pronotum with epimeral sutures complete; praepectus absent; metathoracic sternopleural sutures well-developed, anapleural sutures complete (Figs 412, 413). Wings usually present; forewings with duplicated cilia (except *Asemothrips*). Pelta (Figs 404–406) usually elongate triangular (relatively broad in *Pongola*); tergites with two pairs of sigmoid wing-retaining setae, although these are sometimes reduced; tube usually with straight sides but in various species the tube is broadened, ridged or sculptured; tergite IX setae B_2 of male short and stout (except *Pongola* and *Symphyothrips*); median sternites of male (usually III–V) with one or a pair of transverse areas of reticulate sculpture which is irridescent under phase contrast microscopy (Fig. 391).

The long maxillary stylets, stout maxillary guides, narrow pelta, thoracic sutures, and the short, stout B_2 setae on tergite nine of males indicate that this group is related to the Phlaeothripini. However, members of the latter group are usually associated with Basidiomycete fungi and apparently feed on the external digestion products of the fungal hyphae. In contrast, small pale spores and even branched hyphae have been found in the gut contents of some Docessissophothripini, and it seems possible that this group of species has specialised on some different source of fungal food. Unlike typical Phlaeothripini the males do not have a glandular area on sternite eight, although they usually have characteristic reticulate areas just anterior to the discal setae on the median sternites (Fig. 391). Somewhat similar glandular areas are found in Plectrothripini (Okajima, 1981) and the Idolothripinae genus *Dichaetothrips* (p. 52).

The Docessissophothripini comprises one large, complex and world-wide genus, *Holothrips*, with several small or monobasic genera each of which is geographically restricted and definable from *Holothrips* only on rather weak characters. This pattern of speciation is to be expected in a recently evolved group, and reinforces the view that this tribe has evolved relatively recently from the Phlaeothripini and is phylogenetically distinct from the Idolothripinae.

ABIASTOTHRIPS Priesner

(Fig. 398)

Trichothrips (*Abiastothrips*) Priesner, 1925*d*: 153. Type-species: *Trichothrips schaubergeri* Priesner, by original designation.
Abiastothrips Priesner; Priesner, 1927*a*: 556. [Raised to genus.]
Cratothrips Priesner, 1927*a*: 494–5. Type-species: *Cratothrips angulatus* Priesner, by monotypy. [Synonymised by Zur Strassen, 1974: 119–20.]

The type-species of this genus has a broad inter-antennal projection, small eyes and rounded cheeks; however, *soror* has a more slender head (Fig. 398) which is similar to some species of *Holothrips*. These two species appear to be a Holarctic derivative from the large tropical complex of Docessissophothripini. *Bolothrips lativerticis,* from Oregon and Washington State, in north-western U.S.A., was transferred to *Adelothrips* by Mound (1974*b*: 181) but is here recognised as a synonym of *schaubergeri* from Europe.

SPECIES INCLUDED
***angulatus** Priesner, 1927*a*: 495–6. Holotype ♀, CORSICA (destroyed).
schaubergeri (Priesner, 1920: 86–7) (*Trichothrips*). Holotype ♀, AUSTRIA (SMF).
  priesneri Bagnall, 1933*b*: 658 (*Cratothrips*). Holotype ♀, AUSTRIA (BMNH).
  lativerticis Post, 1961: 141–3 (*Bolothrips*). Holotype ♀, CANADA (CAS). **Syn. n.**
soror Zur Strassen, 1974: 111–20. Holotype ♀, MADEIRA (SMF).

ASEMOTHRIPS Hood **gen. rev.**

(Figs 391, 411)

Asemothrips Hood, 1919*b*: 83. Type-species: *Asemothrips picturatus* Hood, by monotypy.
Empresmothrips Karny, 1920*c*: 40. Type-species: *Empresmothrips combustipes* Karny, by monotypy. **Syn. n.**
Coenothrips Bagnall, 1924: 629. Type-species: *Coenothrips fallax* Bagnall, by monotypy. **Syn. n.**
Eucoenothrips Bagnall, 1926: 553. [Replacement name for *Coenothrips* Bagnall, see Mound, 1968: 75.] **Syn. n.**

Mound (1974*a*), in establishing the above generic synonymies, used the name *Empresmothrips* in error despite the priority of *Asemothrips*. The genus is used for a group of five Australian species which share a series of characters with *Holothrips* species: maxillary stylets and guides, metathoracic sternopleural and anapleural sutures, males with reticulate glandular areas on median sternites (Fig. 391) and short B_2 setae on tergite nine. However, the species of *Asemothrips* lack forewing duplicated cilia, have only two sense cones on the third antennal segment and these both arise ventrally, and the sixth antennal segment is broadly truncate apically (Fig. 411).

SPECIES INCLUDED
combustipes (Karny, 1920*c*: 41) (*Empresmothrips*). Holotype ♀, AUSTRALIA (NRS). **Comb. n.**
fallax (Bagnall, 1924: 629–30) (*Coenothrips*). Holotype ♀, AUSTRALIA (BMNH). **Comb. n.**
  rhopaloides Karny, 1924: 31–2 (*Cryptothrips*). Holotype ♀, AUSTRALIA (NRS).
  froudei Girault, 1927*e*: 1 (*Cryptothrips*). Holotype ♀, AUSTRALIA (QMB).
  silvae Girault, 1927*e*: 1 (*Cryptothrips*). Holotype ♀, AUSTRALIA (QMB).
finlayi (Girault, 1927*b*: 1) (*Cryptothrips*). Holotype ♀, AUSTRALIA (QMB). **Comb. n.**
folii (Girault, 1928*c*: 2) (*Empresmothrips*). Holotype ♂, AUSTRALIA (QMB). **Comb. n.**
pallipes (Karny, 1925*a*: 22–4) (*Empresmothrips*). Holotype ♀, JAVA (SMF). **Comb. n.**, but see Mound, 1971*a*: 400.
picturatus Hood, 1919*b*: 83–4. Holotype ♂, AUSTRALIA (USNM).
  longfellowi Girault, 1926: 1 (*Empresmothrips*). Lectotype ♀, AUSTRALIA (QMB).

DOCESSISSOPHOTHRIPS Bagnall

(Figs 394, 395, 405, 413)

Docessissophothrips Bagnall, 1908*b*: 201–2. Type-species: *Docessissophothrips ampliceps* Bagnall, by monotypy.
Polyphemothrips Schmutz, 1909: 276. Type-species: *Polyphemothrips brasiliensis* Schmutz, by monotypy. **Syn. n.**

The male holotype of *ampliceps*, described originally when mounted dry on a card, is now cleared and mounted in balsam on a microscope slide (Fig. 394). This specimen has been compared with two females from Brazil (in BMNH) which are determined as *brasiliensis* from the original description of that species. In all three specimens the head is strongly elevated medially, and the maxillary stylets lie close together but have a single lateral loop in the prothoracic region. Moreover, the *ampliceps* holotype as well as two specimens determined as *brasiliensis* (in USNM) have the stylets crossing over each other near the posterior margin of the head, although the cross-over itself is scarcely wider than the width of the stylets and might be an artefact. In the unique holotype of *dotatus* this cross-over is, however, more pronounced; the stylet arrangement of this specimen thus approaches that found in the species of *Tropothrips* q.v. The existence of a lateral loop in the stylets of the following species has kindly been confirmed by Steve Nakahara (U.S.D.A., Washington): *corticis, cuneatus, dotatus, tenuiceps, tibialis, travassosi, woytkowski* and *yupanqui*. In *tenuiceps* the stylets are angulate on one side but looped on the other. In *villicornis* the stylets can only be seen on one side and that is angulate. In *cuneatus* the stylets are looped laterally in the holotype (also one male in BMNH) but not in the male labelled 'allotype'. The species *bursarius* has the stylets without lateral loops and is here listed under *Holothrips*. Moreover, the following three species described by Bagnall in *Docessissophothrips* are here listed under the genera indicated: *laticeps* (*Polytrichothrips*); *longiceps* (*Bacillothrips*); *frontalis* (*Oidanothrips*). The type-species of *Docessissophothrips* and *Polyphemothrips* are very similar and must be regarded as congeneric; however, in *ampliceps* the mid-vertex setae on the head lie in the same transverse plane as the postocular setae whereas they lie posterior to the postoculars in *brasiliensis* and the closely related species *major* (Fig. 395). *D. amplus* is also unusual in having yellow mid- and hindcoxae. *D. dotatus* is unique in this group in having four sense cones on antennal segment III as in *Oidanothrips*.

SPECIES INCLUDED
ampliceps Bagnall, 1908*b*: 202–3. Holotype ♂, MEXICO (BMNH).
**annuus* Moulton; nomen nudum *in* Priesner, 1933*a*: 61. NORTH AMERICA.
brasiliensis (Schmutz, 1909: 276–8) (*Polyphemothrips*). Holotype ? ♂, BRAZIL (? lost). **Comb. n.**
****corticis*** (Hood, 1914: 167–9) (*Polyphemothrips*). Holotype ♀, PANAMA (USNM). **Comb. n.**
cuneatus (Hood, 1939*a*: 217–20) (*Polyphemothrips*). Holotype ♀, PERU (USNM). **Comb. n.**
****dotatus*** (Hood, 1955: 108–110) (*Polyphemothrips*). Holotype ♀, BRAZIL (USNM). **Comb. n.**
major Bagnall, 1912: 215. Holotype ♀, no data (BMNH).
****tenuiceps*** (Hood, 1937*a*: 285–8) (*Polyphemothrips*). Holotype ♀, PERU (USNM). **Comb. n.**
tibialis (Hood & Williams, 1915: 136–7) (*Polyphemothrips*). Holotype ♀, U.S.A.: Louisiana (USNM). **Comb. n.**
****travassosi*** (Hood, 1949: 55–9) (*Polyphemothrips*). Holotype ♀, BRAZIL (USNM). **Comb. n.**
****villicornis*** (Hood, 1949: 59–62) (*Polyphemothrips*). Holotype ♀, BRAZIL (USNM). **Comb. n.**
****woytkowskyi*** (Hood, 1937*a*: 288–92) (*Polyphemothrips*). Holotype ♀, PERU (USNM). **Comb. n.**
****yupanqui*** (Hood, 1937*c*: 509–13) (*Polyphemothrips*). Holotype ♀, PERU (USNM). **Comb. n.**

HOLOTHRIPS Karny

(Figs 388–390, 393, 399–404, 407, 409, 412)

Holothrips Karny, 1911: 502. Type-species: *Holothrips ingens* Karny, by monotypy.
Lathrobiothrips Hood, 1933: 421. Type-species: *Lathrobiothrips ramuli* Hood, by monotypy. **Syn. n.**
Panceratothrips Bagnall, 1936: 219–20. Type-species: *Panceratothrips typicus* Bagnall, by monotypy. **Syn. n.**

Adelothrips Hood, 1938*c*: 380. Type-species: *Adelothrips xanthopus* Hood, by original designation. **Syn. n.**
Cordylothrips Hood, 1937*c*: 517–8. Type-species: *Cordylothrips peruvianus* Hood, by monotypy. **Syn. n.**
Ischnothrips Moulton, 1944: 305. Type-species: *Ischnothrips zimmermani* Moulton, by monotypy. **Syn. n.**
Agnostothrips Moulton, 1947*a*: 172–3. Type-species: *Agnostothrips semiflavus* Moulton, by monotypy. **Syn. n.**
Agnostothrips (*Erythrinothrips*) Ananthakrishnan, 1956: 341. Type-species: *Agnostothrips* (*Erythrinothrips*) *indicus* Ananthakrishnan, by monotypy. [Raised to genus by Ananthakrishnan, 1964: 94.] **Syn. n.**
Stinothrips Ananthakrishnan, 1969: 55. Type-species: *Ischnothrips typicus* Ananthakrishnan, by monotypy. **Syn. n.**
Holmiella Zur Strassen, 1972: 95–8. Type-species: *Holmiella nigrita* Zur Strassen, by monotypy. **Syn. n.**

The type-species of *Holothrips* does not appear to have been re-examined since its original description. Hood (1952) described three species in the genus, but he is the only other author to have used the name. Of the three species, only *procerus* has been examined in the present study, and this has the head much longer than *ingens* (Figs 390, 403). In fact, *ingens* is here regarded as the senior synonym of *fenestralis*, described by Hood in *Adelothrips*, and it is closely related to *lanei*. Both of these have the major posteroangular setae on the abdominal tergites long and pale but flattened and remarkably wide (10 μm medially). However, this may be subject to sexual dimorphism because a male identified as *lanei* (in BMNH) has these setae more slender. Both *ingens* and *lanei* have striate sculpture on tergite II, and the head and pelta are very similar, but *lanei* has yellow markings on the hindtibiae and hind margins of the anterior tergites, and *ingens* has a curious pale area ventrally on the midfemora.

Most of the species described in *Adelothrips* are rather small, but no good characters have been found for segregating these small species into a separate genus from *Holothrips*. *Panceratothrips* was erected for a single species with rather stout antennae and with the head elongate and projecting a little in front of the eyes (Fig. 401). *Cordylothrips* (Figs 388, 409) was also erected for a single species with stout antennae, but with segment VI broadly fused to VII+VIII. An undescribed species (in BMNH) from Peru has been studied, however, with antennae intermediate in structure (N.B. this species and *peruvianus* are very similar in head shape and body structure to *Docessissophothrips yupanqui* but do not have looped stylets).

The type-series of *Ischnothrips* (Fig. 389) has the head elongate and elevated dorsally with the stylets closely approximating to the *Docessissophothrips* condition, whereas the type-species of *Agnostothrips* (Fig. 400) has the head shorter as in *ingens*. Neither *Stinothrips* (based on a micropterous holotype, Fig. 399) nor *Erythrinothrips* can be distinguished from *Holothrips*. Similarly the unique holotype of *Holmiella nigrita* is here regarded as a large member of *Holothrips* with the head relatively elongate, but similar in shape to *buccalis* and *bellulus*. Finally, *Lathrobiothrips* was erected originally for one species with the tube exceptionally broad. However, not only do the two subsequent members of this genus have a more elongate tube (Fig. 393), there are other species described in *Adelothrips* with the tube stout but apically constricted (*macrura*) or broad and heavily sculptured (*adelos*). None of these can be distinguished satisfactorily from *Holothrips*.

The interpretation of the genus *Holothrips* adopted here thus involves a wide range of body size, head shape and tube shape. However, the range of form appears to be more or less continuous with no subgroups being evident above the level of relatively small species-groups. All the species studied have antennal segments VII+VIII more or less fused, there being four sense cones on IV and three on III (except *phaeura* and *aberrans* with only two on III). The maxillary guides are well developed, the stylets moderately broad, deeply retracted and parallel in the middle of the head. The metathoracic sternopleural sutures are well developed, and the anapleural sutures complete. The pelta is small and bell-shaped or elongate-triangular, the tergites usually have two pairs of wing-retaining setae (although these are sometimes reduced), and in males the median sternites have transverse bands of reticulation which probably represent glandular areas.

Docessissophothrips appears to represent a small group of large-bodied species derived from *Holothrips*, and *Pongola* and *Symphyothrips* are probably also derived from this genus.

SPECIES INCLUDED

aberrans* (Hood, 1955: 88–90) (*Adelothrips*). Holotype ♀, BRAZIL (USNM). **Comb. n.
acutus (Stannard, 1956: 108–9 (*Adelothrips*). Holotype ♀, U.S.A.: Illinois (INHS). **Comb. n.**
****adelos*** (Mound, 1968: 146) (*Polyphemothrips*). [Replacement name for *caudatus* Hood.] **Comb. n.**
  caudatus Hood, 1955: 90–2 (*Adelothrips*). Holotype ♀, BRAZIL (USNM).
ambitus (Hinds, 1902: 191–2) (*Trichothrips*). Holotype ♀, U.S.A.: Massachusetts (? USNM). **Comb. n.**
****amplus*** Hood, 1952: 160–1. Lectotype ♀, BRAZIL (USNM).
****aspericauda*** Hood, 1952: 161. Holotype ♀, BRAZIL (USNM).
australis (Mound, 1974*a*: 12–5) (*Adelothrips*). Holotype ♀, AUSTRALIA: A.C.T. (ANIC). **Comb. n.**
****bellulus*** (Hood, 1955: 92–4) (*Adelothrips*). Holotype ♀, BRAZIL (USNM). **Comb. n.**
****bicolor*** (Stannard, 1956: 109) (*Adelothrips*). Holotype ♀, MEXICO (INHS). **Comb. n.**
bipartitus (Hood, 1954*b*: 281–2) (*Adelothrips*). Holotype ♀, U.S.A.: Florida (USNM). **Comb. n.**
bratleyi (Watson, 1935: 61–2, & 1937: 12–13) (*Trichothrips*). Syntypes ♀ ♂, U.S.A.: Florida & Alabama (FSAC). **Comb. n.**
  flavus Moulton & Andre, 1936: 225–6 (*Hoplothrips*). Holotype ♀, U.S.A.: Iowa (CAS).
****buccalis*** (Hood, 1955: 94–6) (*Adelothrips*). Holotype ♀, BRAZIL (USNM). **Comb. n.**
****bursarius*** (Hood, 1957: 174) (*Polyphemothrips*). Holotype ♀, BRAZIL (USNM). **Comb. n.**
****caribbeicus*** (Stannard, 1956: 109–10) (*Adelothrips*). Holotype ♀, MEXICO (INHS). **Comb. n.**
caudatus (Bagnall, 1915*b*: 595–6) (*Allothrips*). Holotype ♀, SARAWAK (BMNH). **Comb. n.**
citricornis (Bagnall, 1913: 296) (*Cryptothrips*). Holotype ♂, TANZANIA (BMNH). **Comb. n.**
****conicura*** (Hood, 1942: 611–5) (*Adelothrips*). Holotype ♀, PERU (USNM). **Comb. n.**
****connaticornis*** (Hood, 1925*b*: 65–6) (*Cryptothrips*). Holotype ♂, TRINIDAD (USNM). **Comb. n.**
****cornutus*** (Hood, 1955: 96–9) (*Adelothrips*). Holotype ♀, BRAZIL (USNM). **Comb. n.**
cracens (Ananthakrishnan, 1968*b*: 55–6) (*Polyphemothrips*). Holotype ♀, INDIA (TNA). **Comb. n.**
****eucharis*** (Hood, 1955: 84–8) (*Adelothrips*). Holotype ♀, BRAZIL (USNM). **Comb. n.**
formosus (Hood, 1952*c*: 158–9) (*Adelothrips*). Holotype ♀, BRAZIL (USNM). **Comb. n.**
****fumidus*** (Ananthakrishnan, 1972*b*: 429–30) (*Polyphemothrips*). Holotype ♀, INDIA (TNA). **Comb. n.**
****graminicola*** (Hood, 1952*c*: 157) (*Adelothrips*). Holotype ♀, BRAZIL (USNM). **Comb. n.**
****grandis*** (Stannard, 1956: 110–1) (*Adelothrips*). Holotype ♀, MEXICO (INHS). **Comb. n.**
****hammockensis*** (Stannard, 1956: 111–2) (*Adelothrips*). Holotype ♀, U.S.A.: Florida (INHS). **Comb. n.**
indicus (Ananthakrishnan, 1956*a*: 341–2) (*Agnostothrips: Erythrinothrips*). Holotype ♀, INDIA (TNA). **Comb. n.**
  associatus Ananthakrishnan, 1968*b*: 56–7 (*Symphyothrips*). Holotype ♀, INDIA (TNA).
insignis (Hood, 1938*b*: 162–5) (*Lathrobiothrips*). Holotype ♀, PERU (USNM). **Comb. n.**
ingens Karny, 1911: 502–3. Holotype ♀, PARAGUAY (DEI).
  fenestralis Hood, 1949: 67–70 (*Adelothrips*). Holotype ♀, BRAZIL (USNM). **Syn. n.**
junctus (Hood, 1912*b*: 139–42) (*Cryptothrips*). Lectotype ♀, U.S.A.: Michigan (USNM). **Comb. n.**
  quercus Moulton & Andre, 1936: 225 (*Hoplothrips*). Holotype ♀, U.S.A.: Iowa (CAS).
lanei (Hood, 1949: 63–6) (*Adelothrips*). Holotype ♀, BRAZIL (USNM). **Comb. n.**
****lucyae*** (Gaud, 1961: 117–8) (*Polyphemothrips*). Holotype ♂, PUERTO RICO (RPAESIC). **Comb. n.**
luteus (Faure, 1954*b*: 147–52) (*Polyphemothrips*). Holotype ♀, SOUTH AFRICA (NCIP). **Comb. n.**
****macrura*** (Hood, 1941: 185–7) (*Adelothrips*). Holotype ♀, CUBA (USNM). **Comb. n.**
minor (Hood, 1937*c*: 513–7) (*Polyphemothrips*). Holotype ♂, PERU (USNM). **Comb. n.**
****mirandus*** (Ananthakrishnan, 1969*c*: 305) (*Polyphemothrips*). Holotype ♀, INDIA (TNA). **Comb. n.**
****nepalensis*** (Pelikan, 1970: 366–8) (*Adelothrips*). Holotype ♀, NEPAL (Innsbruck University). **Comb. n.**
nigrita (Zur Strassen, 1972: 96–8) (*Holmiella*). Holotype ♀, KENYA (NRS). **Comb. n.**
palmarum (Hood, 1952*c*: 157) (*Adelothrips*). Holotype ♀, BRAZIL (USNM). **Comb. n.**
****pericles*** (Hood, 1938*c*: 383–6) (*Adelothrips*). Holotype ♀, U.S.A.: Florida (USNM). **Comb. n.**
peruvianus (Hood, 1937*c*: 518–21) (*Cordylothrips*). Holotype ♀, PERU (USNM). **Comb. n.**
****phaeura*** (Hood, 1941: 183–5) (*Adelothrips*). Holotype ♀, U.S.A.: Florida (USNM). **Comb. n.**
procerus Hood, 1952: 160. Holotype ♀, BRAZIL (USNM).
ramuli (Hood, 1933: 421–2) (*Lathrobiothrips*). Lectotype ♀, PANAMA (USNM). **Comb. n.**
****robustus*** (Hood, 1954*b*: 280–1) (*Adelothrips*). Holotype ♀, U.S.A.: Florida (USNM). **Comb. n.**
****ruidus*** (Ananthakrishnan, 1969*c*: 305–6) (*Polyphemothrips*). Holotype ♀, INDIA (TNA). **Comb. n.**
***sculptilis** (Hood, 1942: 609–11) (*Adelothrips*). Holotype ♀, PERU (USNM). **Comb. n.**
semiflavus (Moulton, 1947*a*: 173) (*Agnostothrips*). Holotype ♀, NEW GUINEA (CAS). **Comb. n.**
skwarrae (Priesner, 1933*c*: 146–7) (*Symphyothrips*). Syntype ♀, MEXICO (SMF). **Comb. n.**
****splendidus*** (Johansen, 1977*a*: 39–40) (*Adelothrips*). Holotype ♀, MEXICO (UNAM). **Comb. n.**
****sporophagus*** (Stannard, 1956: 112) (*Adelothrips*). Holotype ♀, VENEZUELA (INHS). **Comb. n.**

speciossissimus (Karny, 1920*c*: 42) (*Nesothrips*). Holotype ♂, AUSTRALIA: Queensland (NRS). **Comb. n.**
****stannardi*** (Ananthakrishnan, 1972*b*: 431–2) (*Polyphemothrips*). Holotype ♀, INDIA (TNA). **Comb. n.**
****subtilis*** (Ananthakrishnan, 1972*b*: 430–1) (*Polyphemothrips*). Holotype ♀, INDIA (TNA). **Comb. n.**
****titschaki*** (Priesner, 1928*c*: 53–4) (*Docessissophothrips*). Holotype ♀, SOUTH AFRICA (Hamburg, destroyed). **Comb. n.**
f. *debilis* Priesner, 1928*c*: 54. Holotype ♀, SOUTH AFRICA (SMF).
****tumidus*** De Santis, 1963*a*: 7–10. Holotype ♂, ARGENTINA (MLPA).
typicus (Bagnall, 1936: 220) (*Panceratothrips*). Lectotype ♀, MADAGASCAR (MNHN).
typicus (Ananthakrishnan, 1967: 235) (*Ischnothrips*). Holotype ♀, INDIA (TNA). **Comb. n.**
****umbricola*** (Hood, 1952*c*: 159–60) (*Adelothrips*). Holotype ♀, BRAZIL (USNM). **Comb. n.**
woytkowski (Hood, 1942: 615–7) (*Lathrobiothrips*). Holotype ♀, PERU (USNM). **Comb. n.**
****xanthopus*** (Hood, 1938*c*: 380–3) (*Adelothrips*). Holotype ♀, U.S.A.: Florida (USNM). **Comb. n.**
zimmermanni (Moulton, 1944: 305–6) (*Ischnothrips*). Holotype ♂, FIJI (BPBM). **Comb. n.**

MAXILLATA Faure **gen. rev.**

(Fig. 385)

Maxillata Faure, 1949*a*: 852–3. Type-species: *Maxillata priesneri* Faure, by monotypy.

This genus was treated in synonymy with *Tropothrips* and *Docessissophothrips* by Stannard (1957). However, unlike the species of those two genera, *priesneri* does not have any part of the maxillary stylets parallel medially in the head. The stylets cross over each other between the compound eyes, and each then follows an independent, undulating course to the mouth aperature (Fig. 385). This stylet arrangement could be interpreted as part of a single transformation series, that is with *Maxillata* regarded as a more advanced and complicated form of *Tropothrips*, and the two genera placed in synonymy. However, the alternative interpretation is adopted here, that the two genera represent independent lines of evolution from *Holothrips*. Two specimens of an unidentified species from Jamaica (in BMNH) have the stylets arranged similarly to *priesneri* as figured by Faure (1949: 855). These specimens cannot, by themselves, be taken as indicating that the *Maxillata* stylet arrangement has evolved independently in both Old and New Worlds, because natural distribution patterns of fungus-feeding thrips are known to have been disrupted by human trading activity between Africa and the West Indies (Mound, 1974*b*: 111). In this connection a single specimen from Ghana (in BMNH) is also of interest. The head of this specimen is like an exaggerated form of *Tropothrips* (Fig. 386), but although the stylets are parallel medially they are both displaced laterally to the right-hand side in the posterior half of the head before producing one or more convolutions. This specimen is dark brown and much larger than *Tropothrips* or *Maxillata* species, although the body is essentially similar in structure to large species of *Holothrips*. It is here regarded as yet another independent off-shoot of *Holothrips*, but cannot be formally described because the specimen lacks antennae.

SPECIES INCLUDED
****priesneri*** Faure, 1949*a*: 854–8. Holotype ♀, SOUTH AFRICA (NCIP).

OIDANOTHRIPS Moulton

(Figs 396, 408)

Oidanothrips Moulton, 1944: 308–9. Type-species: *Oidanothrips magnus* Moulton, by monotypy.

This genus is used here for four large Old World species which are similar to *Holothrips* species but have four sense cones on both the third and fourth antennal segments (Fig. 408). These species probably constitute a holophyletic group, but it is likely that this has developed from within the genus *Holothrips* rather than as a true sister-group. In the type-species sigmoid wing-retaining setae are developed only on tergites II to IV, and the anterior pair is reduced on each segment. The unique holotype of *frontalis* (Fig. 396) was rediscovered recently, dry in a tube (contrary to Mound, 1968), but lacks antennae. It is referred to this genus on the basis of fresh material from Japan and Malaya (Fig. 408). Moreover, *megacephalus* is probably the same species as *frontalis* judging from the description.

SPECIES INCLUDED

****enormis*** (Ananthakrishnan, 1969*c*: 302–3) (*Polyphemothrips*). Holotype ♀, INDIA (TNA). **Comb. n.**
frontalis (Bagnall, 1914*a*: 26–7) (*Docessissophothrips*). Holotype ♀, JAPAN (BMNH). **Comb. n.**
**femoralis* Ishida, 1932: 6–7 (*Machatothrips*). Holotype ♀, JAPAN (Hokkaido Univ.); Kurosawa, 1968: 58.
magnus Moulton, 1944: 309–10. Holotype ♀, FIJI (BPBM).
****megacephalus*** (Ananthakrishnan, 1969*c*: 303–4) (*Polyphemothrips*). Holotype ♀, INDIA (TNA). **Comb. n.**

PONGOLA Zur Strassen

Pongola Zur Strassen, 1959: 186–7. Type-species: *Pongola rufianalis* Zur Strassen, by monotypy.

The only species in this genus has reduced, almost moniliform antennae with two sense cones on segment III and 4 or 3 (even 2) on segment IV. The pronotal epimeral sutures are incomplete and each tergite bears only a single pair of wing-retaining setae. However, the metathoracic sternopleural sutures are present, and the maxillary guides are long and stout although not densely sclerotised. The two most unusual (? apomorphic) characters of the species are the relatively broad pelta (in contrast to *Holothrips*) and the short, medially constricted tube. However, even the condition of these two characters could be regarded as the extremes of transformation series found within *Holothrips* – from which *Pongola* is almost certainly derived. The male has not been examined during the present studies.

SPECIES INCLUDED

rufianalis Zur Strassen, 1959: 187–97. Holotype ♀, SOUTH AFRICA (NCIP).

SYMPHYOTHRIPS Hood & Williams

(Figs 392, 397, 406, 410)

Symphyothrips Hood & Williams, 1915: 131. Type-species: *Symphyothrips punctatus* Hood & Williams, by monotypy.
Mesopotamothrips Liebermann & Gemignani, 1931: 212. Type-species: *Mesopotamothrips concordiensis* Liebermann & Gemignani, by monotypy. [Synonymised by De Santis, 1959: 248.]

Most of the species listed in this genus have not been studied by the present authors, and Hood (1952) indicated that possibly only *caliginosus* is congeneric with *punctatus*. A single specimen from Panama has been examined (in BMNH) with more slender antennal segments than *punctatus* and only one sense cone on segment III (Fig. 410), and this apparently represents a third species. The genus is closely related to *Holothrips* but with only 2 (or 1) sense cones on antennal segment III and 2 on IV. The suture between antennal segments VII and VIII is poorly developed or absent, but the pelta is shorter and broader than in most *Holothrips* species (Fig. 406), being very similar to many *Haplothrips* species. The maxillary stylets and maxillary guides are similar to *Holothrips* (Fig. 397), and the metathoracic sternopleural sutures are well developed, but the anterior pair of wing-retaining setae is often absent on each tergite, even in macropterae. Males of *punctatus* have the typical iridescent reticulate areas anterior to the discal setae on sternites IV–VI, but setae B_2 on tergite nine are long and slender. The short swollen tube of *Symphyothrips* (Fig. 392) species has also evolved in *Holothrips*, amongst the species described under the name *Lathrobiothrips*. The position of *Mesopotamothrips* requires further confirmation, because the illustration of the antenna given by de Santis (1959: 249) suggests that *concordiensis* might be a species of *Holothrips*.

SPECIES INCLUDED

****aberrans*** Ananthakrishnan, 1971: 201–2. Holotype ♀, INDIA (TNA).
****alifanensis*** Bianchi, 1949: 348–50. Holotype ♀, GUAM (BPBM).
****caliginosus*** Hood, 1952*c*: 163–4. Lectotype ♀, BRAZIL (USNM).
****concordiensis*** (Liebermann & Gemignani, 1931: 213–4) (*Mesopotamothrips*). Syntypes ♀, ARGENTINA (MACN).
****longicauda*** Priesner, 1924: 150. Holotype ♂, Baltic amber fossil (? lost).
****longicornis*** Priesner, 1921: 200–2. Syntypes ♀ ♂, PARAGUAY (SMF).

****potosiensis*** Moulton, 1947*b*: 419–20. Holotype ♀, Mexico (CAS).
punctatus Hood & Williams, 1915: 131–3. Holotype ♀, U.S.A.: Florida (USNM).
****reticulatus*** Watson, 1925: 29–30, 45. Holotype ♀, Argentina (FSAC).

TROPOTHRIPS Hood gen. rev.

(Fig. 387)

Tropothrips Hood, 1949: 70–1. Type species: *Tropothrips borgmeieri* Hood, by monotypy.

This genus has been treated as a synonym of *Docessissophothrips* (Stannard, 1957), but although closely related these two genera are here distinguished by the arrangement of the maxillary stylets. In species of both genera the stylets lie close together and parallel medially for at least a short distance, but in *Docessissophothrips* each stylet has only one lateral loop whereas in *Tropothrips* the stylets cross over each other to form a large median loop as well as the pair of lateral loops (Fig. 387). This is not a fundamental difference, however, because *D. dotatus* and *D. ampliceps* each has a small posteromedian cross-over loop. The genus *Maxillata* (q.v.) is also recognised here because of the even more complex arrangement of the stylets. Apart from the maxillary stylets, the rest of the body of *Tropothrips* species, including the antennae, pelta and tergites, is essentially similar to that of *Holothrips* species. The male holotype of *dampfi* has the typical median transverse band of reticulation (? glandular area) on sternites V–VI anterior to the discal setae.

Species included
****borgmeieri*** Hood, 1949: 71–6. Holotype ♀, Brazil (USNM).
dampfi (Priesner, 1933*a*: 59–61) (*Docessissophothrips*). Holotype ♂, Mexico (SMF).
****nigripes*** Stannard, 1954*a*: 84. Holotype ♀, Costa Rica (INHS).
****richardsi*** Stannard, 1954*a*: 82–4. Holotype ♀, U.S.A.: Florida (INHS).
****tuxtlae*** Johansen, 1977*a*: 37–9. Holotype ♀, Mexico (UNAM).

References

Ananthakrishnan, T. N. 1956*a*. *Erythrinothrips*, nov. – A new subgenus of *Agnostothrips* Moulton (Tubulifera, Thysanoptera) from India. *Indian Journal of Entomology* **17** (1955): 341–342.

—— 1956*b*. Studies on some Indian Thysanoptera III. *Zoologischer Anzeiger* **157**: 130–139.

—— 1957. Studies on Indian Thysanoptera IV. *Zoologischer Anzeiger* **159**: 92–102.

—— 1958. Two new species of Tubuliferous Thysanoptera from India (Thysanoptera, Phlaeothripidae). *Proceedings of the Entomological Society of Washington* **60**: 277–280.

—— 1959. Studies on some Indian Thysanoptera V. *Zoologischer Anzeiger* **162**: 313–324.

—— 1960. *Neosmerinthothrips inquilinus* sp. nov., an inquiline Tubuliferan (Thysanoptera) from India. *Bulletin of Entomology, Loyola College, Madras* **1**: 32–33.

—— 1961*a*. New Tubuliferan Thysanoptera from India. *Journal of the Zoological Society of India* **12** (1960): 250–258.

—— 1961*b*. Studies on some Indian Thysanoptera VI. *Zoologischer Anzeiger* **167**: 259–271.

—— 1964*a*. A contribution to our knowledge of the Tubulifera (Thysanoptera) from India. *Opuscula Entomologica* Suppl. 25: 1–120.

—— 1964*b*. Thysanopterologica Indica – I. *Entomologisk Tidskrift* **85**: 99–120.

—— 1966. Thysanopterologica Indica – IV. *Bulletin of Entomology, Loyola College, Madras* **7**: 1–12.

—— 1967. New Indian Thysanoptera. *Annales de la Société Entomologique de France* **3**: 227–237.

—— 1968*a*. Studies on new and little known Indian Thysanoptera. *Oriental Insects* **1**: 113–138.

—— 1968*b*. Thysanopterologica Indica – V. *Oriental Insects* **2**: 41–58.

—— 1968*c*. Two new species of *Nesothrips* with further remarks on *Nesothrips robustus* (*Thysan. Tubulifera*). *Annales de la Société Entomologique de France* **4**: 967–973.

—— 1969*a*. Mycophagous Thysanoptera – I. *Indian Forester* **95**: 173–185.

—— 1969*b*. Mycophagous Thysanoptera – II. *Oriental Insects* **3**: 289–299.

—— 1969*c*. The genus *Polyphemothrips* Schmutz from India. *Oriental Insects* **3**: 301–310.

—— 1969*d*. Indian Thysanoptera. *CSIR Zoological Monograph* **1**, 171 pp. New Delhi.

—— 1970. On some species of *Nesothrips* Kirkaldy with notes on the influence of oedymerism and

gynaecoidism in species of allied genera of Cryptothripini (Tubulifera: Thysanoptera). *Journal of the Zoological Society of India* **22**: 51–62.

—— 1971. Mycophagous Thysanoptera – III. *Oriental Insects* **5**: 189–208.

—— 1972*a*. New species of *Stigmothrips* Ananthakrishnan with keys to Indian species. *Journal of the Zoological Society of India* **23**: 175–185.

—— 1972*b*. Mycophagous Thysanoptera – IV. *Oriental Insects* **6**: 425–437.

—— 1972*c*. Mycophagous Thysanoptera – V. *Oriental Insects* **6**: 439–447.

—— 1973*a*. Studies on some Indian species of the genus *Elaphrothrips* Buffa (Megathripinae: Tubulifera: Thysanoptera). *Pacific Insects* **15**: 271–284.

—— 1973*b*. Mycophagous Tubulifera of India (Thysanoptera: Insecta). *Occasional Publications of the Entomological Research Unit, Loyola College, Madras* **2**: 144 pp., 26 pls.

—— 1978. Thrips galls and gall thrips. *Zoological Survey of India, Technical Monograph* no. 1, 69 pp., 26 pls.

Ananthakrishnan, T. N. & Jagadish, A. 1970. The species of *Diceratothrips* Bagnall and allied genera from India (Thysanoptera: Megathripinae: Insecta). *Oriental Insects* **4**: 265–280.

Andre, F. 1940. The Nearctic species of *Elaphrothrips* Buffa (Thysanoptera: Phlaeothripidae). *Proceedings of the Entomological Society of Washington* **42**: 75–90.

Bagnall, R. S. 1908*a*. On some new and curious Thysanoptera (Tubulifera) from Papua. *Annals and Magazine of Natural History* (8) **1**: 355–363.

—— 1908*b*. On some new genera and species of Thysanoptera. *Transactions of the Natural History Society of Northumberland* **3**: 183–217.

—— 1909*a*. Synonymical notes; with description of a new genus of Thysanoptera. *Annales de la Société Entomologique de Belgique* **52**: 348–352.

—— 1909*b*. Notes on Thysanoptera (Tubulifera) new to the British fauna, with description of a new species of *Megathrips*. *Entomologist's Monthly Magazine* **45**: 129–132.

—— 1909*c*. On some new and little-known exotic Thysanoptera. *Transactions of the Natural History Society of Northumberland* **3**: 524–540.

—— 1909*d*. On two new genera of Thysanoptera from Venezuela: *Anactinothrips* and *Actinothrips*. *Journal of the Linnaean Society* (Zoology) **30**: 329–335.

—— 1910*a*. A contribution towards a knowledge of the neotropical Thysanoptera. *Journal of the Linnaean Society* (Zoology) **30**: 369–387.

—— 1910*b*. Thysanoptera. *In*: *Fauna Hawaiiensis* **3**: 669–701. London.

—— 1911. Descriptions of three new Scandinavian Thysanoptera (Tubulifera). *Entomologist's Monthly Magazine* **46**: 60–63.

—— 1912. Preliminary descriptions of three new species of Thysanoptera. *Annals and Magazine of Natural History* (8) **9**: 214–217.

—— 1913. Brief descriptions of new Thysanoptera. – I. *Annals and Magazine of Natural History* (8) **12**: 290–299.

—— 1914*a*. Brief descriptions of new Thysanoptera. – II. *Annals and Magazine of Natural History* (8) **13**: 22–31.

—— 1914*b*. Brief descriptions of new Thysanoptera. – III. *Annals and Magazine of Natural History* (8) **13**: 287–297.

—— 1914*c*. Brief descriptions of new Thysanoptera. – IV. *Annals and Magazine of Natural History* (8) **14**: 375–381.

—— 1915*a*. Brief descriptions of new Thysanoptera. – V. *Annals and Magazine of Natural History* (8) **15**: 315–324.

—— 1915*b*. Brief descriptions of new Thysanoptera. – VI. *Annals and Magazine of Natural History* (8) **15**: 588–597.

—— 1915*c*. A preliminary account of the Thysanoptera of Borneo. *Sarawak Museum Journal* **2**: 267–272.

—— 1916. Brief descriptions of new Thysanoptera. – VIII. *Annals and Magazine of Natural History* (8) **17**: 397–412.

—— 1917. On a collection of Thysanoptera from St Vincent, with descriptions of four new species. *Journal of Zoological Research* **2**: 21–27.

—— 1918. Brief descriptions of new Thysanoptera. – IX. *Annals and Magazine of Natural History* (9) **1**: 201–221.

—— 1921*a*. On Thysanoptera from the Seychelles Islands and Rodrigues. *Annals and Magazine of Natural History* (9) **7**: 257–293.

—— 1921*b*. Brief descriptions of new Thysanoptera. – XI. *Annals and Magazine of Natural History* (9) **7**: 355–368.

—— 1921*c*. Brief descriptions of new Thysanoptera. – XII. *Annals and Magazine of Natural History* (9) **8**: 393–400.

—— 1923. Brief descriptions of new Thysanoptera. – XIII. *Annals and Magazine of Natural History* (9) **12**: 624–631.

—— 1924. Brief descriptions of new Thysanoptera. – XIV. *Annals and Magazine of Natural History* (9) **14**: 625–640.

—— 1926. Brief descriptions of new Thysanoptera. – XVI. *Annals and Magazine of Natural History* (9) **18**: 545–560.

—— 1927. Contributions towards a knowledge of the European Thysanoptera. – II. *Annals and Magazine of Natural History* (9) **19**: 564–575.

—— 1928. On some Samoan and Tongan Thysanoptera, with special reference to *Ficus* gall-causers and their inquilines. Thysanoptera. *In*: *Insects of Samoa* **7**: 55–76, London.

—— 1929. On some new and interesting Thysanoptera of economic importance. *Bulletin of Entomological Research* **20**: 69–76.

—— 1932. Brief descriptions of new Thysanoptera. – XVII. *Annals and Magazine of Natural History* (10) **10**: 505–520.

—— 1933*a*. More new and little-known British thrips. *Entomologist's Monthly Magazine* **69**: 120–123.

—— 1933*b*. Contributions towards a knowledge of the European Thysanoptera. – IV. *Annals and Magazine of Natural History* (10) **11**: 647–661.

—— 1934*a*. Brief descriptions of new Thysanoptera. – XVIII. *Annals and Magazine of Natural History* (10) **13**: 481–498.

—— 1934*b*. Contributions towards a knowledge of the Thysanopterous genus *Elaphrothrips* Buffa. – I. *Annals and Magazine of Natural History* (10) **13**: 627–636.

—— 1935. Contributions towards a knowledge of the Thysanopterous genus *Elaphrothrips* Buffa. – II. *Annals and Magazine of Natural History* (10) **15**: 130–146.

—— 1936. Descriptions of some new Thysanoptera from tropical Africa and Madagascar. *Revue Française d'Entomologie* **3**: 219–230.

Bergroth, E. 1888. Diagnose d'une nouvelle espèce de Thysanoptères. *Bulletin de la Société Entomologique de Belgique* **1888**: xxx.

Bianchi, F. A. 1944. *Nesothrips* Kirkaldy supersedes *Oedemothrips* Bagnall. *Proceedings of the Hawaiian Entomological Society* **12**: 31–38.

—— 1945. Introduction to the Thysanoptera of New Caledonia. *Proceedings of the Hawaiian Entomological Society* **12**: 249–278.

—— 1947. Thysanoptera Hawaiiensis – I. *Proceedings of the Hawaiian Entomological Society* **13**: 37–42.

—— 1949. New thrips records and species from the Marianas. *Proceedings of the Hawaiian Entomological Society* **13**: 347–350.

—— 1953. Thysanoptera of Samoa. *Proceedings of the Hawaiian Entomological Society* **15**: 93–108.

Bournier, A. 1956. Trois espèces nouvelles de Phloeothripidae (Thysanopt.). *Bulletin de la Société Entomologique de France* **61**: 160–174.

—— 1962. Thysanoptères de France, II. Descriptions sommaire de quelques espèces nouvelles du Languedoc Méditerranéen. *Bulletin de la Société Entomologique de France* **67**: 41–43.

—— 1967. Thysanoptères de Madagascar. *Annales de la Société Entomologique de France* (N.S.) **3**: 1015–1027.

—— 1968. Thysanoptères de l'Angola. IV. *Publicações Culturais de Companhia de Diamantes de Angola* **77**: 135–164.

—— 1970. Thysanoptères du Gabon. *Biologia Gabonica* **6**: 151–168.

—— 1971. Thysanoptères d'Afrique noire. *Bulletin de l'I.F.A.N.* (A) **33**: 145–167.

—— 1974. Thysanoptères de l'Angola: VI. *Publicações Culturais de Companhia de Diamantes de Angola* **88**: 153–165.

Buffa, P. 1908. Esame della raccolta di Tisanotteri Italiani esistente nel Museo Civico di Storia Naturale di Genova. *Redia* **4**: 382–391.

—— 1909. I Tisanotteri esotici esistenti nel Museo Civico di Storia Naturale di Genova. *Redia* **5**: 157–172.

Chen, L. S. 1980. Thrips associated with Mulberry plant (*Morus* sp.) in Taiwan. *Proceedings of the National Science Council, Taiwan* **4**: 169–182.

Cott, H. E. 1956. Systematics of the suborder Tubulifera (Thysanoptera) in California. *University of California Publications in Entomology* **13**: 1–216.

Crawford, D. L. 1910. Thysanoptera of Mexico and the South. II. *Pomona College Journal of Entomology* **2**: 153–170.

Crawford, J. C. 1947. The North American species of the genus *Megalothrips* Uzel (Thysanoptera, Phlaeothripidae). *Proceedings of the Entomological Society of Washington* **49**: 197–199.
—— 1948. A new *Parallothrips* from Cyprus. *Proceedings of the Entomological Society of Washington* **50**: 213–215.
De Santis, L. 1943. Especies nuevas y conocidas de la Republica Argentina. *Revista de la Facultad de Agronomia de La Plata* **25**: 89–96.
—— 1957. Dos nuevos Tubuliferos de la Republica Argentina (Thysanoptera: Tubulifera). *Revista de la Uruguaya de Entomologia* **2**: 1–4.
—— 1958. Las especies Argentinas del genero *Leptogastrothrips* (Thysanoptera: Tubulifera). *Revista de la Facultad de Agronomia* **34**: 95–102.
—— 1960. Un nuevo Tisanoptero gigante del Brasil. *Actas y trabajos del Primer Congreso Sudamericano de Zoologia* **3**: 57–60.
—— 1963*a*. Adiciones a la Fauna Argentina de Tisanopteros III. *Notas Comision de Investigacion Cientifica, Provincia de Bueños Aires* **1**: 1–14.
—— 1963*b*. Tisanopteros de Tierra del Fuego. *Revista de la Sociedad Entomologica Argentina* **24**: 63–66.
Dyadechko, N. P. 1961. A new thrips species *Embothrips tubversicolor* sp. nov. (Thysanoptera). [In Russian.] *Dopovidi Akademie Nauk Ukrayin'skoi RSR. Kiev* **1961** (5): 688–690.
—— 1962. A new thrips species (Thysanoptera) from South Maritime Provinces – *Cryptothrips maritimus* Djadetschko sp. n. [In Russian.] *Zoologicheskii Zhurnal* **41**: 764–765.
—— 1964. *Thrips (Thysanoptera) of the European part of the U.S.S.R.* 387 pp. Kiev. [In Russian.]
Faure, J. C. 1925. A new genus and five new species of South African Thysanoptera. *South African Journal of Natural History* **5**: 143–166.
—— 1933. New genera and species of Thysanoptera from South Africa. *Bulletin of the Brooklyn Entomological Society* **28**: 1–20, 55–75.
—— 1942. Records and descriptions of South African Thysanoptera – III. *Journal of the Entomological Society of Southern Africa* **5**: 74–83.
—— 1943. Two new species of *Bolothrips* (Thysanoptera) from South Africa. *Journal of the Entomological Society of Southern Africa* **6**: 86–89.
—— 1945. Two new species of *Allothrips* (Thysanoptera) from South Africa. *Proceedings of the Royal Entomological Society of London* (B) **14**: 150–154.
—— 1949*a*. *Maxillata priesneri* gen. et spec. nov., a thrips (Thysanoptera) with exceedingly long maxillae. *Annals and Magazine of Natural History* (12) **2**: 851–858.
—— 1949*b*. Three remarkable new genera of Phlaeothripidae (Thysanoptera) from South Africa. *Entomology Memoirs. Department of Agriculture, Union of South Africa* **2**: 204–217.
—— 1949*c*. A new species of *Pygothrips* Hood (Pygothripidae, Thysanoptera) from Zululand. *Journal of the Entomological Society of Southern Africa* **12**: 118–122.
—— 1954*a*. South African Thysanoptera – I. *Journal of the Entomological Society of Southern Africa* **17**: 9–26.
—— 1954*b*. South African Thysanoptera – II. *Journal of the Entomological Society of Southern Africa* **17**: 145–166.
—— 1955. South African Thysanoptera – 3. *Journal of the Entomological Society of Southern Africa* **18**: 13–41.
—— 1956. South African Thysanoptera – 5. *Journal of Entomological Society of Southern Africa* **19**: 313–341.
Froggatt, W. W. 1904. Studies on Australian Thysanoptera: the genus *Idolothrips*, Haliday. *Proceedings of the Linnean Society of New South Wales* **1904**: 54–57.
Gaud, S. M. 1961. The Thysanoptera of Puerto Rico. *Technical Papers of the Agricultural Experimental Station, Puerto Rico* **32**: 1–160.
Gauld, I. D. & Mound, L. A. 1982. Homoplasy and the delineation of holophyletic genera in some insect groups. *Systematic Entomology* **7**: 73–86.
Girault, A. A. 1926. *New pests from Australia, V.* Published privately. 4 pp. Brisbane.
—— 1927*a*. *Some new wild animals from Queensland.* Published privately. 3 pp. Brisbane.
—— 1927*b*. *New Australian animals so far overlooked by outsiders.* Published privately. 2 pp. Brisbane.
—— 1927*c*. *Thysanoptera nova Australiensis from Queensland.* Published privately. 1 pp. Brisbane.
—— 1927*d*. *Thysanoptera nova Australiensis, II.* Published privately. 2 pp. Brisbane.
—— 1927*e*. *A discourse on wild animals.* Published privately. 2 pp. Brisbane.
—— 1928*a*. *A prodigeous discourse on wild animals.* Published privately. 3 pp. Brisbane.
—— 1928*b*. *Some Insecta and a new All Highness. (Notes compiled in fear and sorrow.).* Published privately. 4 pp. Brisbane.

—— 1928c. *Notice of a curious professor and of native wasps and wood lice.* Published privately. 4 pp. Brisbane.
—— 1929. *New pests from Australia VI.* Published privately. 1 pp. Brisbane.
—— 1930. *New pests from Australia, VII.* Published privately. 3 pp. Brisbane.
Greenwood, P. H. 1980. Towards a phyletic classification of the 'genus' *Haplochromis* (Pisces, Cichlidae) and related taxa. Part II; The species from Lakes Victoria, Nabugabo, Edward, George and Kivu. *Bulletin of the British Museum (Natural History)* (Zoology) **39**: 1–101.
Haga, K. 1975. A revision of the genus *Pyrgothrips* Karny with keys to the world species (Thysanoptera, Tubulifera). *Kontyû* **43**: 263–280.
Haliday, A. H. 1852. Order III. Physapoda. *In* Walker, F., *List of the specimens of Homopterous insects in the collection of the British Museum* Pt IV: 1094–1118.
Hartwig, E. K. 1948. Six new species of South African Thysanoptera, with statistical analyses of measurements. *Journal of the Entomological Society of Southern Africa* **11**: 83–126.
—— 1952. Taxonomic studies of South African Thysanoptera, including genitalia, statistics and a revision of Trybom's types. *Entomology Memoirs. Department of Agriculture, Union of South Africa* **2**: 339–499.
Heeger, E. 1852*a*. Beiträge zur Naturgeschichte der Physapoden (Blassenfusse). *Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften, Wien* **9**: 123–141.
—— 1852*b*. Beiträge zur Insecten-Fauna Österreichs. *Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften, Wien* **9**: 473–490.
Hennig, W. 1966. *Phylogenetic Systematics.* Translated by D. D. Davis & R. Zangerl, 263 pp. Urbana.
Hesse, A. J. 1934. Some insects associated with the plant *Gnidia (Arthrosolen) laxa* Gilg.-Thysanoptera. *Annals of the South African Museum* **30**: 434–440.
Hinds, W. E. 1902. Contribution to a monograph of the insects of the order Thysanoptera inhabiting North America. *Proceedings of the United States National Museum* **26**: 79–242, 11 pls.
Hood, J. D. 1908*a*. New genera and species of Illinois Thysanoptera. *Bulletin of the Illinois State Laboratory of Natural History* **8**: 361–379.
—— 1908*b*. Three new North American Phloeothripidae. *Canadian Entomologist* **40**: 305–309.
—— 1908*c*. Two new species of *Idolothrips. Annals of the Entomological Society of America* **1**: 285–289.
—— 1912*a*. Three new Phloeothripidae (Thysanoptera) from Texas and Michigan. *Proceedings of the Biological Society of Washington* **25**: 11–15.
—— 1912*b*. On North American Phloeothripidae (Thysanoptera), with descriptions of two new species. *Canadian Entomologist* **44**: 137–144.
—— 1912*c*. Descriptions of new North American Thysanoptera. *Proceedings of the Entomological Society of Washington* **14**: 129–160.
—— 1914. Studies on tubuliferous Thysanoptera. *Proceedings of the Biological Society of Washington* **27**: 151–172.
—— 1915. A remarkable new thrips from Australia. *Proceedings of the Biological Society of Washington* **28**: 49–51.
—— 1916. *Oedaleothrips hookeri,* a new genus and species of Thysanoptera. *Bulletin of the Brooklyn Entomological Society* **11**: 64–65.
—— 1918*a*. A new *Kleothrips* (Thysanoptera) from North Queensland. *Bulletin of the Brooklyn Entomological Society* **13**: 77–79.
—— 1918*b*. New genera and species of Australia Thysanoptera. *Memoirs of the Queensland Museum* **6**: 121–150.
—— 1919*a*. On some new Idolothripidae. *Insecutor Inscitiae Menstruus* **7**: 66–74.
—— 1919*b*. Two new genera and thirteen new species of Australian Thysanoptera. *Proceedings of the Biological Society of Washington* **32**: 75–91.
—— 1924. New Thysanoptera from the United States. *Entomological News* **35**: 312–317.
—— 1925*a*. On some new Phloeothripidae (Thysanoptera) from the Transvaal. *Psyche* **31**: 292–301.
—— 1925*b*. New neotropical Thysanoptera collected by C. B. Williams. *Psyche* **32**: 48–69.
—— 1925*c*. Six new Thysanoptera from the western United States. *Entomological News* **36**: 101–105, 134–138.
—— 1925*d*. Four new Phloeothripidae from the United States (Thysanoptera). *Canadian Entomologist* **57**: 218–222.
—— 1927*a*. A contribution toward the knowledge of New York Thysanoptera, with descriptions of new genera and species II. *Entomologica Americana* **7**: 209–245.
—— 1927*b*. New western Thysanoptera. *Proceedings of the Biological Society of Washington* **40**: 197–204.
—— 1928. A new *Actinothrips* (Thysanoptera) from Brazil. *Bulletin of the Brooklyn Entomological Society* **23**: 147–150.

—— 1933. New Thysanoptera from Panama. *Journal of the New York Entomological Society* **41**: 407–434.
—— 1934. Some further new Thysanoptera from Panama. *Proceedings of the Biological Society of Washington* **47**: 57–81.
—— 1935*a*. Ten new Thysanoptera from Panama. *Proceedings of the Biological Society of Washington* **48**: 83–106.
—— 1935*b*. Some new or little known Thysanoptera of the family Phlaeothripidae. *Revista de Entomologia, Rio de Janeiro* **5**: 159–199.
—— 1935*c*. The thysanopterous genus *Actinothrips*. *Stylops* **4**: 247–254.
—— 1936*a*. Nine new Thysanoptera from the United States. *Journal of the New York Entomological Society* **44**: 81–100.
—— 1936*b*. Two new *Anactinothrips* from South America (Thysanoptera). *Proceedings of the Royal Entomological Society of London* (B) **5**: 143–147.
—— 1936*c*. Studies in Neotropical Thysanoptera. I. *Revista de Entomologia, Rio de Janeiro* **6**: 248–279.
—— 1936*d*. Studies in Neotropical Thysanoptera. II. *Revista de Entomologia, Rio de Janeiro* **6**: 424–460.
—— 1937*a*. Studies in Neotropical Thysanoptera. IV. *Revista de Entomologia, Rio de Janeiro* **7**: 255–296.
—— 1937*b*. A new ant-like thrips from Florida. *Proceedings of the Biological Society of Washington* **50**: 111–113.
—— 1937*c*. Studies in Neotropical Thysanoptera. V. *Revista de Entomologia, Rio de Janeiro* **7**: 486–530.
—— 1938*a*. A new genus and species of Phlaeothripidae (Thysanoptera) from Palmetto. *Proceedings of the Biological Society of Washington* **51**: 27–32.
—— 1938*b*. Studies in Neotropical Thysanoptera. VI. *Revista de Entomologia, Rio de Janeiro* **8**: 161–187.
—— 1938*c*. New Thysanoptera from Florida and North Carolina. *Revista de Entomologia, Rio de Janeiro* **8**: 348–420.
—— 1938*d*. Studies in Neotropical Thysanoptera. VII. *Revista de Entomologia, Rio de Janeiro* **9**: 218–247.
—— 1939*a*. A new *Polyphemothrips* (Thysanoptera) from Peru. *Revista Chilena de Historia Natural* **42**: 217–220.
—— 1939*b*. New North American Thysanoptera, principally from Texas. *Revista de Entomologia, Rio de Janeiro* **10**: 550–619.
—— 1940*a*. A century of new American Thysanoptera. I. *Revista de Entomologia, Rio de Janeiro* **11**: 540–583.
—— *1940b*. The cause and significance of macropterism and brachypterism in certain Thysanoptera, with description of a new Mexican species. *Anales de la Escuela Nacional de Ciencias Biologicas* **1**: 497–505.
—— 1941. A century of new American Thysanoptera. II. *Revista de Entomologia, Rio de Janeiro* **12**: 139–243.
—— 1942. A century of new American Thysanoptera. III. *Revista de Entomologia, Rio de Janeiro* **12**: 547–678.
—— 1949. Brasilian Thysanoptera. I. *Revista de Entomologia, Rio de Janeiro* **20**: 3–88.
—— 1950. Brasilian Thysanoptera. II. *Revista de Entomologia, Rio de Janeiro* **21**: 1–113.
—— 1951. A new *Oedaleothrips* from Italy. *Memorie della Società Entomologica Italiana* **30**: 133–140.
—— 1952*a*. A new *Oedaleothrips* from the Belgian Congo. *Revue de Zoologie et de Botanique Africaine* **45**: 204–209.
—— 1952*b*. Brasilian Thysanoptera. III. *Proceedings of the Biological Society of Washington* **65**: 141–174.
—— 1952*c*. *Mecynothrips snodgrassi,* a new thrips from the Solomon Islands. *Proceedings of the Entomological Society of Washington* **54**: 294–301.
—— 1954*a*. Brasilian Thysanoptera. IV. *Proceedings of the Biological Society of Washington* **67**: 17–54.
—— 1954*b*. New Thysanoptera, principally Floridian. *Proceedings of the Biological Society of Washington* **67**: 277–286.
—— 1954*c*. Three new Thysanoptera from Trinidad and British Guiana. *Proceedings of the Royal Entomological Society of London* (B) **23**: 205–212.
—— 1955. Brasilian Thysanoptera. VI. *Revista Brasileira de Entomologia, São Paulo* **4**: 51–160.
—— 1957. New Brazilian Thysanoptera. *Proceedings of the Biological Society of Washington* **70**: 129–180.
—— 1958. A new *Zeugmatothrips* from Brazil. *Proceedings of the Biological Society of Washington* **60**: 225–228.
Hood, J. D. & Williams, C. B. 1915. New Thysanoptera from Florida and Louisiana. *Journal of the New York Entomological Society,* **23**: 121–138.
International Commission on Zoological Nomenclature. 1961. *International Code of Zoological Nomenclature.* 176 pp. London.
Ishida, I. 1932. Fauna of the Thysanoptera in Japan. *Insecta Matsumurana* **7**: 1–16.

Jacot-Guillarmod, C. F. 1937. Ten new species of Thysanoptera and a catalogue of the known South African forms. *Publications of the University of Pretoria.* (Series II, Natural Science) **3**: 1–62.

—— 1939*a*. New species of Phlaeothripidae (Thysanoptera) from South Africa. *Journal of the Entomological Society of Southern Africa* **1**: 47–77.

—— 1939*b*. Phlaeothripidae (Thysanoptera) new to South Africa, with descriptions of new genera and species. *Journal of the Entomological Society of Southern Africa* **2**: 36–62.

—— 1940. Studies on South African Thysanoptera – I. *Journal of the Entomological Society of Southern Africa* **3**: 131–138.

—— 1941. Studies on South African Thysanoptera – II. *Journal of the Entomological Society of Southern Africa* **4**: 80–100.

—— 1942. Studies on South African Thysanoptera – III. *Journal of the Entomological Society of Southern Africa* **5**: 64–74.

—— 1978. Catalogue of the Thysanoptera of the World. Part 5. *Annals of the Cape Provincial Museums* (Natural History) **7**: 1257–1556.

Johansen, R. M. 1974. Siete nuevos Tisanopteros de Tabasco, Veracruz, y el Pedregal de San Angel, Mexico, D. F. (Thysanoptera: Terebrantia: Tubulifera). *Revista de la Sociedad Mexicana de Historia Natural* **35**: 249–276.

—— 1975. Un nuevo *Zeuglothrips* Hood Panameno, y descripcion del macho de *Z. guerreronis* Johansen y Garcia Aldrete, 1973 (Thysanoptera: Phlaeothripidae). *Revista de la Sociedad Mexicana de Historia Natural* **36**: 187–194.

—— 1976. Nuevos thrips tubuliferous (Insecta: Thysanoptera), de Mexico, I. *Anales del Instituto de Biologia, Universidad de Mexico* (Zoologia) **47**: 57–68.

—— 1977*a*. Nuevos thrips tubuliferous (Insecta: Thysanoptera), de Mexico. III. *Anales del Instituto de Biologia, Universidad de Mexico* (Zoologia) **48**: 37–50.

—— 1977*b*. Nuevos thrips tubuliferous (Insecta: Thysanoptera), de Mexico. IV. *Anales del Instituto de Biologia, Universidad de Mexico* (Zoologia) **48**: 51–69.

—— 1978*a*. Dos nuevas especies de *Elaphrothrips* Buffa, 1909 (Thysanoptera: Phlaeothripidae), del sureste de Mexico. *Anales del Instituto de Biologia, Universidad de Mexico* (Zoologia) **49**: 87–94.

—— 1978*b*. Seis nuevas especies de *Elaphrothrips* Buffa, 1909 (Thysanoptera: Phlaeothripidae) de Brasil y Peru. *Anales del Instituto de Biologia, Universidad de Mexico* (Zoologia) **49**: 95–113.

—— 1978*c*. Notas sinonimicas acerca de Tisanopteros de Mexico. I. *Anales del Instituto de Biologia, Universidad de Mexico* (Zoologia) **49**: 277–280.

—— 1979. Nuevos thrips tubuliferous (Insecta: Thysanoptera), de Mexico. VI. *Anales del Instituto de Biologia, Universidad de Mexico* (Zoologia) **50**: 179–191.

Johansen, R. M. & Garcia Aldrete, A. N. 1973. Una nueva especie Mexicana de *Zeuglothrips* Hood. (Thysanoptera: Phlaeothripidae). *Revista de la Sociedad Mexicana de Historia Natural* **34**: 55–61.

—— —— 1976. A new Mexican *Dasythrips* (Thysanoptera; Phlaeothripidae). *Revista de Biologia Tropical* **24**: 235–241.

Karny, H. 1911. Neue Phloeothripiden – Genera. *Zoologischer Anzeiger* **38**: 501–504.

—— 1912*a*. Ueber einige afrikanische Thysanopteren. *Entomologische Zeitschrift, Fauna Exotica* **2** (5): 19–20, 22–26.

—— 1912*b*. Gallenbewohnende Thysanopteren aus Java. *Marcellia* **11**: 115–169.

—— 1912*c*. Einige weitere Tubuliferen aus dem tropischen Afrika. *Entomologische Rundschau* **29**: 130–133, 138–139, 150–151.

—— 1913*a*. Uber gallenbewohnende Thysanopteren. *Verhandlungen der Zoologisch-Botanischen Gesellschaft in Wien* **63**: 5–12.

—— 1913*b*. Beitrag zur Thysanopteren-Fauna von Neu-Guinea und Neu-Britannien. *Archiv für Naturgeschichte* **79** (1): 123–136.

—— 1913*c*. H. Sauter's Formosa-Ausbeute. *Supplementa Entomologica* **2**: 127–134.

—— 1913*d*. Thysanoptera von Japan. *Archiv fur Naturgeschichte* **79** (2): 122–128.

—— 1916. Beiträge zur Kenntnis der Gallen von Java. Zweite Mitteilung über die javanischen Thysanopterocecidien und deren Bewohner [in part]. *Zeitschrift für Wissenschaftliche Insektenbiologie* **12**: 84–94.

—— 1919. Synopsis der Megathripidae (Thysanoptera). *Zeitschrift für Wissenschaftliche Insektenbiologie* **14**: 105–118.

—— 1920*a*. Die exotischen Tubuliferen (Thysanoptera) des Deutschen Entomologischen Museums (Berlin-Dahlem). *Entomologische Mitteilungen* **9**: 88–94, 104–111, 186–191.

—— 1920*b*. Some Thysanoptera from the Philippine Islands. *Philippine Journal of Science* **17**: 203–211.

—— 1920*c*. Nova Australska Thysanoptera, jez nashbiral Mjöberg. *Časopis Ceskoslovenské Společnosti Entomologické* **17**: 35–44.

—— 1921*a*. Zur Systematik der Orthopteroiden Insekten, & Beitraege zur Malayischen Thysanopterenfaune. *Treubia* **1**: 163–269, 277–291.

—— 1921*b*. Ergaenzung zu Priesner's "*Haplothrips*-studien" die Australischen Haplothripinen. *Treubia* **2**: 21–36.

—— 1921*c*. Beitraege zur Malayischen Thysanopterenfauna. *Treubia* **2**: 37–83.

—— 1923. Beiträge zur Malayischen Thysanopterenfauna. *Treubia* **3**: 277–380.

—— 1924. Results of Dr E. Mjöberg's Swedish Scientific Expeditions to Australia 1910–1913. 38. Thysanoptera. *Arkiv für Zoologi* **17**A (2): 1–56.

—— 1925*a*. Die an Tabak auf Java und Sumatra Angetroffenen Blasenfüsser. *Bulletin van het Deli Proefstation, Medan, Sumatra* **23**: 1–55.

—— 1925*b*. On some tropical Thysanoptera. *Bulletin of Entomological Research* **16**: 125–142.

—— 1925*c*. Über *Phloeothrips sanguinolentus* Bergroth nebst einer Revision der Diceratothripinen-Genera. *Notulae Entomologicae* **5**: 77–84.

Kelly, R. & Mayne, R. J. B. 1934. *The Australian Thrips, a monograph of the Order Thysanoptera in Australia*. 81 pp. Sydney.

Kirkaldy, G. W. 1907. On two Hawaiian Thysanoptera. *Proceedings of the Hawaiian Entomological Society* **1**: 102–103.

Knechtel, W. K. 1936. Zur Kenntnis der Thysanopterenfauna Rumaniens. *Bulletin de la Section Scientifique de l'Académie Roumaine* **17**: 159–162.

Kudô, I. 1975. New name for the subgenus *Telothrips* Kudô et Ananthakrishnan, not Priesner (Thysanoptera, Phlaeothripidae). *Kontyû* **43**: 421.

Kudô, I. & Ananthakrishnan, T. N. 1974. A new subgenus and species of *Meiothrips* Priesner (Thysanoptera, Megathripinae) from Nepal. *Kontyû* **42**: 385–387.

Kurosawa, M. 1932. Descriptions of three new thrips from Japan. *Kontyû* **5**: 230–242.

—— 1968. Thysanoptera of Japan. [In Japanese, English summary.] *Insecta Matsumurana* Suppl. 4: 1–94.

Lieberman, J. & Gemignani, E. V. 1931. Un nuevo género y dos nuevas especies de Thysanópteros argentinos. *Revista de la Sociedad Entomologica, Argentina* **3**: 211–216.

Maltbaek, J. 1928. Tillaeg til Thysanoptera Danica, Danske Frynsevinger. *Entomologiske Meddelelser* **16**: 369–381.

Maynard Smith, J. 1958. *The theory of evolution*. 344 pp. Harmondsworth, Middlesex.

Morgan, A. C. 1925. A new genus, a new subgenus and seven new species of Thysanoptera from Porto Rico. *Florida Entomologist* **9**: 1–9.

Morison, G. D. 1958. Thysanoptera from South-West Arabia and Ethiopia. *Journal of the Linnean Society of London* (Zoology) **43**: 587–598.

Moulton, D. 1907. A contribution to our knowledge of the Thysanoptera of California. *Miscellaneous Papers, Technical Series of the Bureau of Entomology, United States Department of Agriculture* **12**: 39–68.

—— 1928*a*. Thysanoptera of the Hawaiian Islands. *Proceedings of the Hawaiian Entomological Society* **7**: 105–134.

—— 1928*b*. Thysanoptera from Abyssinia. *Annals and Magazine of Natural History* (10) **2**: 227–248.

—— 1928*c*. New Thysanoptera from Formosa. *Transactions of the Natural History Society of Formosa* **18**: 287–328.

—— 1928*d*. The Thysanoptera of Japan: new species, notes, and a list of all known Japanese species. *Annotationes Zoologicae Japonenses* **2**: 287–337.

—— 1928*e*. New Thysanoptera from India. *Indian Forest Records* **13**: 285–292.

—— 1929*a*. New California Thysanoptera. *Pan-Pacific Entomologist* **4**: 125–136.

—— 1929*b*. New Mexican Thysanoptera. *Pan-Pacific Entomologist* **6**: 11–20.

—— 1929*c*. Contribution to our knowledge of American Thysanoptera. *Bulletin of the Brooklyn Entomological Society* **24**: 224–244.

—— 1930. Thysanoptera from South Africa. *Annals and Magazine of Natural History* (10) **5**: 414–416.

—— 1933*a*. The Thysanoptera of South America (IV). *Revista de Entomologia, Rio de Janeiro* **3**: 385–419.

—— 1933*b*. New Thysanoptera from India. *Indian Forest Records* **19**: 1–6.

—— 1934. New Thysanoptera of the Hawaiian Islands. *Proceedings of the Hawaiian Entomological Society* **8**: 499–503.

—— 1935. New species of thrips from South-Western Australia. *Journal of the Royal Society of Western Australia* **21**: 97–100.

—— 1938. Thysanoptera from Minas Geraes, Brazil. *Revista de Entomologia, Rio de Janeiro* **9**: 374–383.

—— 1939. Thysanoptera collected by the Mangarevan Expedition. *Occasional Papers of the Bernice P. Bishop Museum, Hawaii* **15**: 141–148.

—— 1941. Thysanoptera from Minas Gerais, Brazil. *Revista de Entomologia, Rio de Janeiro* **12**: 314–323.

—— 1942*a*. Seven new genera of Thysanoptera from Australia and New Zealand. *Bulletin of the Southern California Academy of Sciences* **41**: 1–13.

—— 1942*b*. Insects of Guam-I, Thysanoptera. *Bulletin of the Bernice P. Bishop Museum, Hawaii* **172**: 7–16.

—— 1944. Thysanoptera of Fiji. *Occasional Papers of the Bernice P. Bishop Museum, Hawaii* **17**: 267–311.

—— 1947*a*. Thysanoptera from New Guinea, the Philippine Islands and the Malay Peninsula. *Pan-Pacific Entomologist* **23**: 172–180.

—— 1947*b*. New Thysanoptera from Mexico. *Anales de la Escuila Nacional de Ciencias Biologicas* **4**: 419–421.

—— 1949. New Thysanoptera from Africa. *Annals and Magazine of Natural History* (12) **2**: 481–499.

—— 1968. New Thysanoptera from Australia. *Proceedings of the California Academy of Sciences* (4) **36**: 93–124.

Moulton, D. & Andre, F. 1936. Four new Thysanoptera, with a preliminary list of the species occurring in Iowa. *Iowa State College Journal of Science* **10**: 223–234.

Moulton, D. & Steinweden, J. B. 1932. New Marquesan Thysanoptera. *Bulletin of the Bernice P. Bishop Museum, Hawaii* **98**: 165–168.

—— —— 1933. Thysanoptera from the Society Islands. *Bulletin of the Bernice P. Bishop Museum, Hawaii* **113**: 29–33.

—— —— 1935. Two new species of *Cryptothrips* (Thysanoptera) from the Maquesas. *Bulletin of the Bernice P. Bishop Museum, Hawaii* **114**: 163–165.

Mound, L. A. 1968. A review of R. S. Bagnall's Thysanoptera Collections. *Bulletin of the British Museum (Natural History)* (Entomology) Suppl. 11: 1–181.

—— 1969. Revision of three Australian genera of Phlaeothripidae (Thysanoptera) with seven new species, and one new generic synonym. *Journal of the Australian Entomological Society* **8**: 173–186.

—— 1970. Thysanoptera from the Solomon Islands. *Bulletin of the British Museum (Natural History)* (Entomology) **24**: 83–126.

—— 1971*a*. Gall-forming thrips and allied species (Thysanoptera: Phlaeothripinae) from *Acacia* trees in Australia. *Bulletin of the British Museum (Natural History)* (Entomology) **25**: 387–466.

—— 1971*b*. A review of the Melanesian genus *Mecynothrips* (Thysanoptera). *Journal of Natural History* **5**: 279–283.

—— 1972*a*. Polytypic species of spore-feeding Thysanoptera in the genus *Allothrips* Hood (Phlaeothripidae). *Journal of the Australian Entomological Society* **11**: 23–36.

—— 1972*b*. Species complexes and the generic classification of leaf-litter thrips of the tribe Urothripini (Phlaeothripidae). *Australian Journal of Zoology* **20**: 83–103.

—— 1974*a*. Spore-feeding thrips (Phlaeothripidae) from leaf litter and dead wood in Australia. *Australian Journal of Zoology* (Suppl. Series) **27**: 1–106.

—— 1974*b*. The *Nesothrips* complex of spore-feeding Thysanoptera (Phlaeothripidae: Idolothripinae). *Bulletin of the British Museum (Natural History)* (Entomology) **31**: 107–188.

—— 1974*c*. *Andrethrips floydi* – a remarkable new Thysanopteron. *Journal of Entomology* (B) **43**: 109–113.

—— 1977. Species diversity and the systematics of some New World leaf litter Thysanoptera (Phlaeothripinae: Glyptothripini). *Systematic Entomology* **2**: 225–244.

Mound, L. A., Heming, B. S. & Palmer, J. M. 1980. Phylogenetic relationships between the families of recent Thysanoptera (Insecta). *Zoological Journal of the Linnean Society* **69**: 111–141.

Mound, L. A., Morison, G. D., Pitkin, B. R. & Palmer, J. M. 1976. Thysanoptera. *Handbooks for the Identification of British Insects* **1** (11): 1–79.

Mound, L. A. & Palmer, J. M. 1981. Phylogenetic relationships between some genera of Thripidae (Thysanoptera). *Entomologica Scandinavica* Suppl. 15: 153–170.

Mound, L. A. & Walker, A. K. 1982. Thysanoptera: Terebrantia. *In*: *Fauna of New Zealand,* D.S.I.R., Wellington **1:** 1–113.

—— —— 1983. Thysanoptera: Tubulifera. *In*: *Fauna of New Zealand*, D.S.I.R., Wellington. [in prep.]

Newman, E. 1855. Characters of two undescribed species of *Thrips*, Lin. *Transactions of the Entomological Society of London* **3**: 264–267.

Okajima, S. 1975. Notes on the Thysanoptera from the Ryukyu Islands. I. Descriptions of two new species. *Kontyû* **43**: 13–19.

—— 1976. Notes on the Thysanoptera from the Ryukyu Islands. II. On the genus *Stigmothrips* Ananthakrishnan. *Kontyû* **44**: 119–129.

—— 1979*a*. A revisional study of the genus *Apelaunothrips* (Thysanoptera: Phlaeothripidae). *Systematic Entomology* **4**: 39–64.
—— 1979*b*. Notes on the Thysanoptera from Southeast Asia VI. A new species of the genus *Mecynothrips* from Taiwan (Phlaeothripidae). *Transactions of the Shikoku Entomological Society* **14**: 127–130.
—— 1979*c*. Two new species of the genus *Gastrothrips* Hood (Thysanoptera: Phlaeothripidae) from Japan and Taiwan. *Kontyû* **47**: 511–516.
—— 1981. A revision of the tribe Plectrothripini of fungus-feeding Thysanoptera (Phlaeothripidae: Phlaeothripinae). *Systematic Entomology* **6**: 219–336.
Palmer, J. M. & Mound, L. A. 1978. Nine genera of fungus-feeding Phlaeothripidae (Thysanoptera) from the Oriental Region. *Bulletin of the British Museum (Natural History)* (Entomology) **37**: 153–215.
Pelikan, J. 1961. Two new species of *Oedaleothrips* (Thysanoptera) from Asia. *Casopis Ceskoslovenské Společnosti Entomologické* **58**: 302–309.
—— 1965. Ergebnisse der zoologischen Forschungen von Dr. Z. Kaszab in der Mongolei. 29. Thysanoptera. *Annales Historico-Naturales Musei Nationalis Hungarici* **57**: 229–239.
—— 1970. Thysanopteren aus Nepal (Ins., Thysanoptera). *Khumbu Himal* **3**: 361–369.
Pergande, T. 1896. Description of a new species of *Idolothrips*. *Entomological News* **7**: 63–64.
Pitkin, B. R. 1978. Lectotype designations of certain species of thrips described by J. D. Hood and notes on his collection (Thysanoptera). *Proceedings of the Entomological Society of Washington* **80**: 264–295.
Pitkin, B. R. & Mound, L. A. 1973. A catalogue of West African Thysanoptera. *Bulletin de l'I.F.A.N.* (A) **35**: 407–449.
Post, R. L. 1961. Five new Oregon Thysanoptera. *Pan-Pacific Entomologist* **37**: 137–143.
Priesner, H. 1919. Zur Thysanopteren-Fauna der ostadriatischen Küstenländer. *Zeitschrift des Österreichischen Entomologen-Vereines* **4**: 104–106.
—— 1920. Kurze Beschreibungen neuer Thysanopteren aus Österreich. *Sitzungberichte der Akademie der Wissenschaften, Mathematisch-naturwissenschaftliche Klasse, Wien* **129**: 71–88.
—— 1921. Neue und wenig bekannte Thysanopteren der neotropischen Fauna aus der Sammlung des Berliner Zoologischen Museums. *Deutsche Entomologishe Zeitschrift* **1921**: 187–223.
—— 1922. Ueber albanische Thysanopteren. *Wiener Entomologische Zeitung* **39**: 105–107.
—— 1924. Bernstein-Thysanopteren. *Entomologische Mitteilungen* **13**: 130–151.
—— 1925*a*. Zwei neue, beachtenswerte Thysanopteren-typen aus Ungarn. *Zeitschrift des Oesterreichischen Entomologen-Vereines* **10**: 5–7.
—— 1925*b*. Neue Thysanopteren. *Deutsche Entomologische Zeitschrift* **1925**: 13–28.
—— 1925*c*. Thysanopterologica I. *Zoologische Jarbücher, Jena* **50**: 305–319.
—— 1925*d*. Katalog der europäischen Thysanopteren. *Konowia* **4**: 141–159.
—— 1926*a*. Die Jugendstadien der malayischen Thysanopteren. *Treubia* **8** (Suppl.): 1–264.
—— 1926*b*. Un genero nuevo y curioso del orden physopodos o Thysanopteros (insectos) de Mexico. *Memorias y Revista de la Sociedad Cientifica 'Antonio Alzate'* **44**: 485–489.
—— 1927*a*. *Die Thysanopteren Europas* pp. 343–568. Wien.
—— 1927*b*. Ein neuer *Zeugmatothrips* (Thysanoptera: Tubulifera) aus Costarica. *Bollettino del Laboratorio di Zoologia generale e agraria della R. Scuola superiore di Agricoltura di Portici* **20**: 189–190.
—— 1927*c*. Neue und wenig bekannte Thysanopteren, gesammelt in Westafrika von Prof. Dr. F. Silvestri. *Bollettino del Laboratorio di Zoologia generale e agraria dell R. Scuola superiore di Agricoltura di Portici* **21**: 61–83.
—— 1928*a*. *Die Thysanopteren Europas* pp. 569–755. Wien.
—— 1928*b*. Über australische Thysanopteren. *Sitzungberichte der Akademie der Wissenschaften. Mathematisch-Naturwissenschaftliche Klasse, Wien* **137**: 643–659.
—— 1928*c*. Thysanopterologica III. *Zoologische Jarbücher, Jena* **56**: 43–66.
—— 1929*a*. Bernstein-Thysanopteren II. *Bernstein-Forschungen* **1**: 111–138.
—— 1929*b*. Spolia Mentawiensia: Thysanoptera. *Treubia* **11**: 187–210.
—— 1932. Thysanopteren aus dem Belgischen Congo. *Revue de Zoologie et de Botanique Africaines* **22**: 321–344.
—— 1933*a*. Neue Thysanopteren aus Mexiko, gesammelt von Prof. Dr. A. Dampf. *Wiener entomologische Zeitung* **50**: 49–63.
—— 1933*b*. Indomalayische Thysanopteren IV. *Konowia* **12**: 69–85.
—— 1933*c*. Neue exotische Thysanopteren. *Stylops* **2**: 145–156.
—— 1934. Drei neue Phloeothripiden (Thysanoptera). *Stylops* **3**: 58–63.
—— 1935*a*. Indomalayische Thysanopteren VI. *Konowia* **14**: 159–174, 241–253, 323–339.
—— 1935*b*. Neue exotische Thysanopteren. *Stylops* **4**: 125–131.
—— 1935*c*. New or little known Oriental Thysanoptera. *Philippine Journal of Science* **57**: 351–375.

—— 1936*a*. Ueber einege neue und wenig bekannte Thysanopteren. *Proceedings of the Royal Entomological Society of London* (B)**5**: 208–214.
—— 1936*b*. On some further new Thysanoptera from the Sudan. *Bulletin de la Société Royale Entomologique d'Egypte* **20**: 83–104
—— 1937*a*. Thysanopterologica V: Zwei neue Phlaeothripiden. *Arbeiten über morphologische und taxonomische Entomologie* **4**: 347–350.
—— 1937*b*. Two new Phlaeothripidae from Sierra Leone. *Annals and Magazine of Natural History* (10) **20**: 624–629.
—— 1939*a*. Thysanopterologica VIII. *Proceedings of the Royal Entomological Society of London* (B)**8**: 73–78.
—— 1939*b*. Thysanopteren aus dem Belgischen Congo. *Revue de Zoologie et de Botanique Africaines* **33**: 49–66.
—— 1940. Thysanopterologica IX. *Philippine Journal of Science* **71**: 403–411.
—— 1949. Genera Thysanopterorum. Keys for the identification of the genera of the Order Thysanoptera. *Bulletin de la Societe Fouad Ier d'Entomologie* **33**: 31–157.
—— 1950. Contributions towards a knowledge of the Thysanoptera of Egypt, XV. *Bulletin de la Societe Fouad Ier d'Entomologie* **34**: 25–37.
—— 1951. Thysanopterologica XI. *Annals and Magazine of Natural History* (12)**4**: 355–371.
—— 1952*a*. On some new genera and species of Thysanoptera from the Oriental region. *Indian Journal of Entomology* **13**: 183–200.
—— 1952*b*. On some central African Thysanoptera. *Bulletin de l'Institut Français d'Afrique Noire* **14**: 842–880.
—— 1959. On the genus *Dinothrips* Bgn. (Thysanoptera). *Idea* **12**: 52–59.
—— 1961. Das System der Tubulifera (Thysanoptera). *Anzeiger Österreichische Akademie der Wissenschaften* **1960**: 283–296.
—— 1964. Ordnung Thysanoptera. *Bestimmungsbücher zur Bodenfauna Europas* **2**, 242 pp. Berlin.
Ramakrishna Ayyar, T. V. 1925. Two new Thysanoptera from South India. *Journal of the Bombay Natural History Society* **30**: 788–792.
—— 1928. A contribution to our knowledge of the Thysanoptera of India. *Memoirs of the Department of Agriculture in India* (Entomological series) **10**: 217–316.
—— 1934. Entomological investigations on the spike disease of Sandal (21), Thysanoptera. *Indian Forest Records* **20**: 1–12.
Ramakrishna Ayyar, T. V. & Margabandhu, V. 1939. Notes on new and known Indian Thysanoptera. *Records of the Indian Museum* **41**: 21–33.
Rayment, T. 1948. Observations on Thrips, with description of a new species. *Australian Zoologist* **11**: 255–258.
Reuter, O. M. 1879. Diagnoser öfver nya Thysanoptera från Finland. *Öfversigt af Finska Vetenskaps-Societetens förhandlingar* **1878–1879**: 207–223.
—— 1885. Thysanoptera Fennica, descripsit. I. Tubulifera. *Bidrag till Kännedom af Finlands Natur och Folk* **40**: 1–26.
—— 1901. Thysanoptera tria Mediterranea. *Öfversigt af Finska Vetenskaps-Societetens Förhandlingar* **43**: 214–215.
Sakimura, K. 1971. A review of the genus *Rhaebothrips* Karny (Thysanoptera: Phlaeothripidae). *Pacific Insects* **13**: 391–403.
—— 1979. Notes on some Cryptothripine species from Polynesia, with description of a new species (Phlaeothripidae: Thysanoptera). *Pacific Insects* **20**: 313–317.
Sakimura, K. & Bianchi, F. A. 1977. A review of the Hawaiian species of Idolothripinae (Phlaeothripidae: Thysanoptera). *Proceedings of the Hawaiian Entomological Society* **22**: 495–523.
Schmutz, K. 1909. Zur Kenntnis einiger neuen Thysanopterengenera (Tubulifera). *Annalen des Naturhistorischen Museums, Wien* **23**: 273–281. 342–347.
—— 1913. Zur Kenntnis der Thysanopterenfauna von Ceylon. *Sitzungsberichte der Akademie der Wissenschaften in Wien* **122**: 991–1089.
Seshadri, A. R. & Ananthakrishnan, T. N. 1954. Some new Indian Thysanoptera I. *Indian Journal of Entomology* **16**: 210–256.
Solowinow, P. 1924. Neue Arten Blasenfüsse. *Entomologische Zeitschrift* **38**: 25–26.
Stannard, L. J. 1953. *Illinothrips rossi,* new genus and species (Thysanoptera; Phlaeothripidae). *Transactions of the Illinois Academy of Science* **46**: 193–196.
—— 1954*a*. *Tropothrips* in North America (Thysanoptera; Phlaeothripidae). *Proceedings of the Biological Society of Washington* **67**: 81–84.

—— 1954*b*. *Actinothrips (Hybridothrips) oneillae*, new subgenus and species. *Proceedings of the Entomological Society of Washington* **56**: 71–74.
—— 1955. The species and subspecies of North American *Allothrips* (Thysanoptera: Phlaeothripidae). *Annals of the Entomological Society of America* **48**: 151–157.
—— 1956. Six new species of *Adelothrips* from the New World with critical remarks on this genus and related genera (Thysanoptera: Tubulifera). *Proceedings of the Biological Society of Washington* **69**: 105–114.
—— 1957. The phylogeny and classification of the North American genera of the suborder Tubulifera (Thysanoptera). *Illinois Biological Monographs* **25**: 1–200.
—— 1974. *Atractothrips mockfordi*, a new species from Mexico (Thysanoptera: Phlaeothripidae). *Proceedings of the Entomological Society of Washington* **76**: 45–48.
—— 1976. A synopsis of some ant-mimicking thrips, with special reference to the American fauna (Thysanoptera: Phlaeothripidae: Idolothripinae). *Journal of the Kansas Entomological Society* **49**: 492–508.
Stys, P. 1967. Monograph of Malcinae, with reconsideration of morphology and phylogeny of related groups (Heteroptera, Malcidae). *Acta Entomologica Musei Nationalis, Pragae* **37**: 351–516.
Takahashi, R. 1935. An interesting thrips from Amami-Oshima, Loochoos. *Mushi* **8**: 61–63.
—— 1937. Descriptions of new Thysanoptera from Formosa, with notes on the species found on the high elevations of the island. *Tenthredo* **1**: 339–350.
Targioni-Tozzetti, A. 1881. Relazione intoro ai lavori della R. Stazione di entomologia agraria di Firenze per gli anni 1877–78. Art. V. Fisapodi (Thrips). *Annali di Agricoltura* **34**: 120–134.
Thomasson, G. L. & Post, R. L. 1966. I. North Dakota Tubulifera (Thysanoptera). *North Dakota Insects* **6**: 1–56.
Titschack, E. 1964. Zur Variation der Borstenlänge von *Cryptothrips nigripes* O. M. Reuter 1880 (Thysanoptera). *Verhandlungun des Vereins für Naturwissenschaftliche Heimatforschung* **36**: 45–51.
—— 1965. *Cryptothrips nigripes* O. M. Reuter, subspec. *phariacus* nom. nov. *Verhandlungen des Vereins fur Naturwissenschaftliche Heimatforschung* **36**: 147.
Trybom, F. 1908. Physapoda, *In* Sjöstedt, *Wissenschaftliche Ergebnisse der schwedischen Zoologischen Expedition nach der Kilimanjaro und Meru, 1905–1906* **16**: 1–23.
—— 1910. Zwei neue Physapoden aus Madagaskar. *Voeltzkow's Reise in Ostafrika in den Jahren 1903–1905, Wissenschaftliche Ergebnisse* **2**: 521–525.
—— 1912. Physapoden aus Natal und dem Zululande. *Arkiv für Zoologi* **7**(33): 1–52.
Uzel, H. 1895. *Monographie der Ordnung Thysanoptera*. 472 pp. Königgrätz.
Vuillet, A. 1914. Description d'un *Dicaiothrips* nouveau de l'Inde (Thysanopt. Idolothripidae). *Bulletin de la Société Entomologique de France* **1914**: 276–278.
Walker, F. 1859. Characters of some apparently undescribed Ceylon insects. *Annals and Magazine of Natural History* (3) **4**: 217–224.
Watson, J. R. 1919. New Thysanoptera from Florida-IV. *Florida Buggist* **2**: 97–102.
—— 1920. New Thysanoptera from Florida-VII. *Florida Entomologist* **4**: 18–23, 27–30.
—— 1921. New Thysanoptera from New York. *Bulletin of the Brooklyn Entomological Society* **16**: 78–86.
—— 1923. Synopsis and catalog of the Thysanoptera of North America. *Technical Bulletin of the Agricultural Experimental Station, University of Florida* **168**: 1–98.
—— 1925. A new species of *Symphyothrips* (Thysanoptera) from Argentina. *Florida Entomologist* **9**: 29–30, 45.
—— 1931. A collection of Thysanoptera from Western Oklahoma. *Publications of the University of Oklahoma Biological Survey* **3**: 339–345.
—— 1933. Two new species of *Oedaleothrips* with notes on other species. *Florida Entomologist* **17**: 48–50; 63–64.
—— 1934/35/37. Thysanoptera of the Geenton. *Florida Entomologist* **18**: 44–46, 55–62; **20**: 12–15, 17–21.
Woo, K. S. 1974. Thysanoptera of Korea. *Korean Journal of Entomology* **4**: 1–90.
Yakhontov, V. V. 1956. New genus and species of thrips from Zailisk Ala-Tai. [In Russian.] *Zoologicheskii Zhurnal* **35**: 554–555.
Zur Strassen, R. 1959. Studies in African Thysanoptera, 2. *Journal of the Entomological Society of Southern Africa* **22**: 174–198.
—— 1966. Neue Fransenflüglearten aus der Unterordnung Tubulifera von den Kanarischen Inseln (Ins., Thysanoptera). *Commentationes Biologicae* **29**: 1–34.
—— 1968. Ökologische und zoogeographische Studien über die Fransenflüger-Fauna (Ins., Thysanoptera) des südlichen Marokko. *Abhandlungen der Senckenbergischen Naturforschenden Gesellschaft* **515**: 1–125.

—— 1972. Äthiopische Thysanopteran überwiegend aus dem Massiv des Mount Elgon in Kenya (Insecta, Thysanoptera). *Zoologica Scripta* **1**: 85–105.
—— 1974. Neue silvicole Fransenflügler von den makaronesischen Inseln (Ins.: Thysanoptera). *Senckenbergiana Biologica* **55**: 105–134.
—— 1976. La faune terrestre de l'Ile de Sainte-Hélène. Part 3. 18. Thysanoptera. *Annales Musée Royal de l'Afrique Centrale,* Sciences Zoologiques (8) **215**: 236–256.
—— 1977. Internationales Forschungsprojekt Makaronesischer Raum. Studie zur Frühjahrsfauna der Fransenflügler auf den Madeira-Inseln im Atlantik nebst Daten zur Abundanz und Faunistik (Insecta: Thysanoptera). *Boletim do Museu Municipal do Funchal* **31**: 5–78.
—— 1979. Insects of Saudi Arabia. Thysanoptera. *Fauna of Saudi Arabia* **1**: 90–104.
—— 1980. *Anactinothrips gibbifer* n. sp. aus Baumkronen im Amazonas-Gebiet (Insecta: Thysanoptera: Phlaeothripidae). *Senckenbergiana Biologica* **61**: 47–56.

Table 6 Distribution of species in Pygothripina genera

	NT	NA	PA	AT	O	A	P
Cleistothrips	—	—	—	—	—	—	1
Heptathrips	—	—	—	3	—	—	5
Ozothrips	—	—	—	—	—	—	3
Pelinothrips	—	—	—	—	—	2	—
Phaulothrips	—	—	—	1	—	10	1
Emprosthiothrips	—	—	—	—	—	6	—
Priesneriana	—	—	—	—	2	2	—
Cryptothrips	—	3	4	—	1	—	—
Pygothrips	5	4	—	—	—	2	1

Table 7 Distribution of species in Allothripina genera

	NT	NA	PA	AT	O	A	P
Allidothrips	—	—	1	1	—	—	—
Allopisothrips	—	—	—	—	—	—	1
Allothrips	3	5	2	2	3	3	—
Faureothrips	—	—	—	1	—	—	—
Priesneriella	—	3	4	—	—	—	1
Pseudocryptothrips	1	—	1	1	—	—	—

Table 8 Distribution of species in Compsothripina genera

	NT	NA	PA	AT	O	A	P
Anaglyptothrips	—	—	—	—	—	—	1
Bolothrips	—	5	6	5	—	—	—
Compsothrips	8	7	4	3	3	—	—
Illinothrips	—	1	—	—	—	—	—
Loyolaia	—	—	—	—	1	—	—

Table 9 Distribution of species in Gastrothripina

	NT	NA	PA	AT	O	A	P
Gastrothrips	18	5	1	3	6	—	—

Table 10 Distribution of species in Diceratothripina genera

	NT	NA	PA	AT	O	A	P
Carientothrips	1	—	—	—	2	13	2
Nesothrips	—	—	—	—	3	9	13
Campulothrips	—	—	—	—	—	—	1
Elgonima	—	—	—	1	—	—	—
Pseudoeurynchothrips	—	—	—	2	—	—	—
Neosmerinthothrips	11	—	—	4	6	—	1
Phacothrips	1	—	—	—	—	—	—
Nesidiothrips	—	—	—	1	1	—	—
Acallurothrips	7	1	—	5	2	—	1
Diceratothrips	16	5	—	—	—	—	—
Sporothrips	—	1	—	—	—	—	—

Table 11 Distribution of species in Macrothripina genera

	NT	NA	PA	AT	O	A	P
Aesthesiothrips	—	—	—	—	1	—	—
Celidothrips	—	—	—	—	1	2	1
Diaphorothrips	—	—	—	—	2	—	2
Dichaetothrips	1	—	—	—	2	—	—
Diplacothrips	2	—	—	—	—	—	—
Ethirothrips	1	—	—	4	13	10	4
Herathrips	—	—	—	—	—	1	—
Ischyrothrips	—	—	—	—	1	—	—
Machatothrips	—	—	—	3	11	—	—
Macrothrips	—	—	—	—	1	—	—
Peltariothrips	—	—	—	—	1	—	—
Polytrichothrips	—	—	—	—	1	—	—
Tarassothrips	—	—	—	—	1	—	—

Table 12 Distribution of species in Elaphrothripina genera

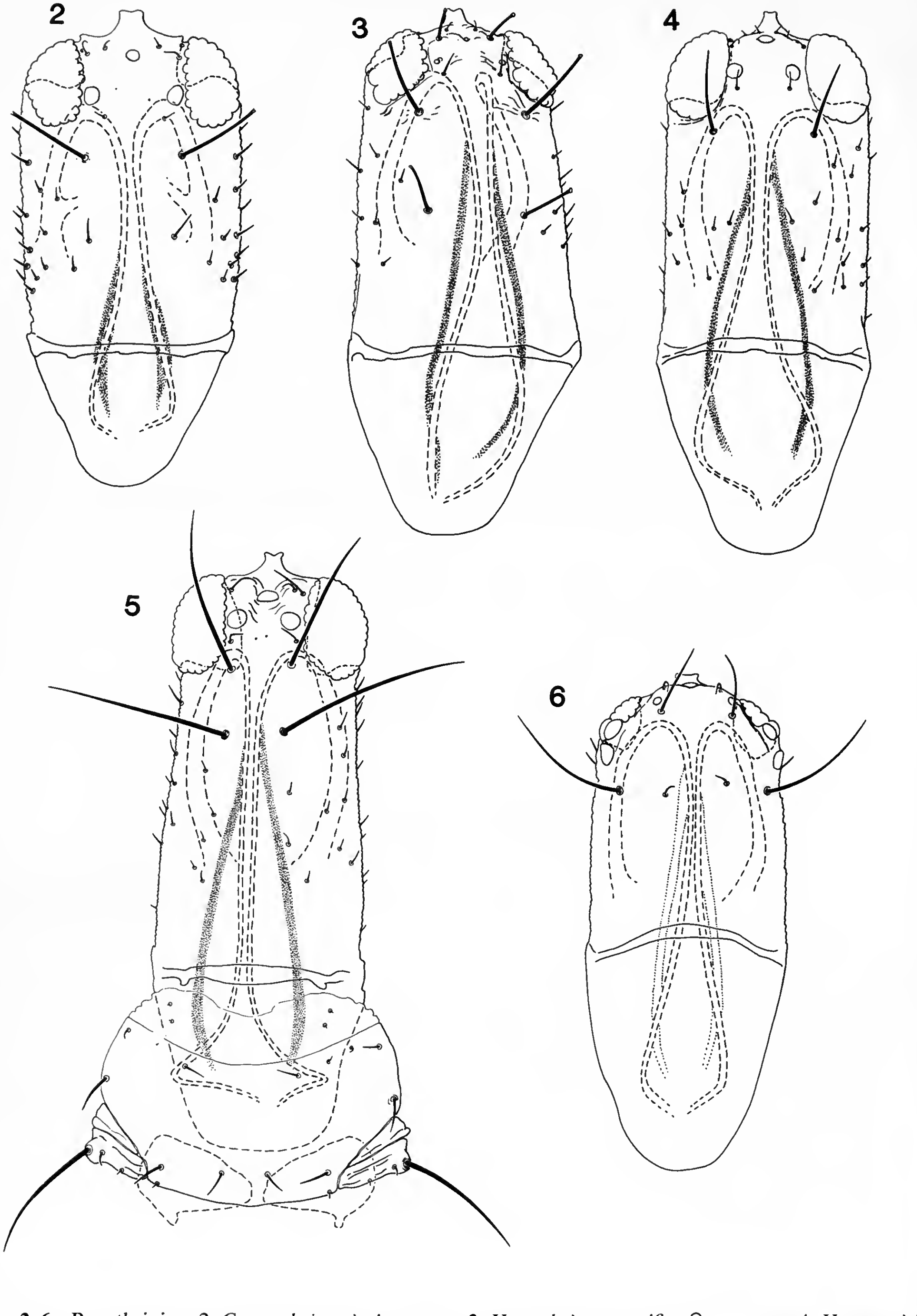
	NT	NA	PA	AT	O	A	P
Anactinothrips	15	—	—	—	—	—	—
Elaphrothrips	46	7	—	49	19	—	—
Ophthalmothrips	—	—	—	4	5	1	—
Mecynothrips	—	—	—	1	9	3	2
Lamillothrips	—	—	—	3	—	—	—
Dinothrips	—	—	—	—	5	—	—
Tiarothrips	—	—	—	—	1	—	—
Hartwigia	—	—	—	1	—	—	—
Malesiathrips	—	—	—	—	1	—	2
Dermothrips	—	—	—	—	—	—	1

Table 13 Distribution of species in Idolothripina genera

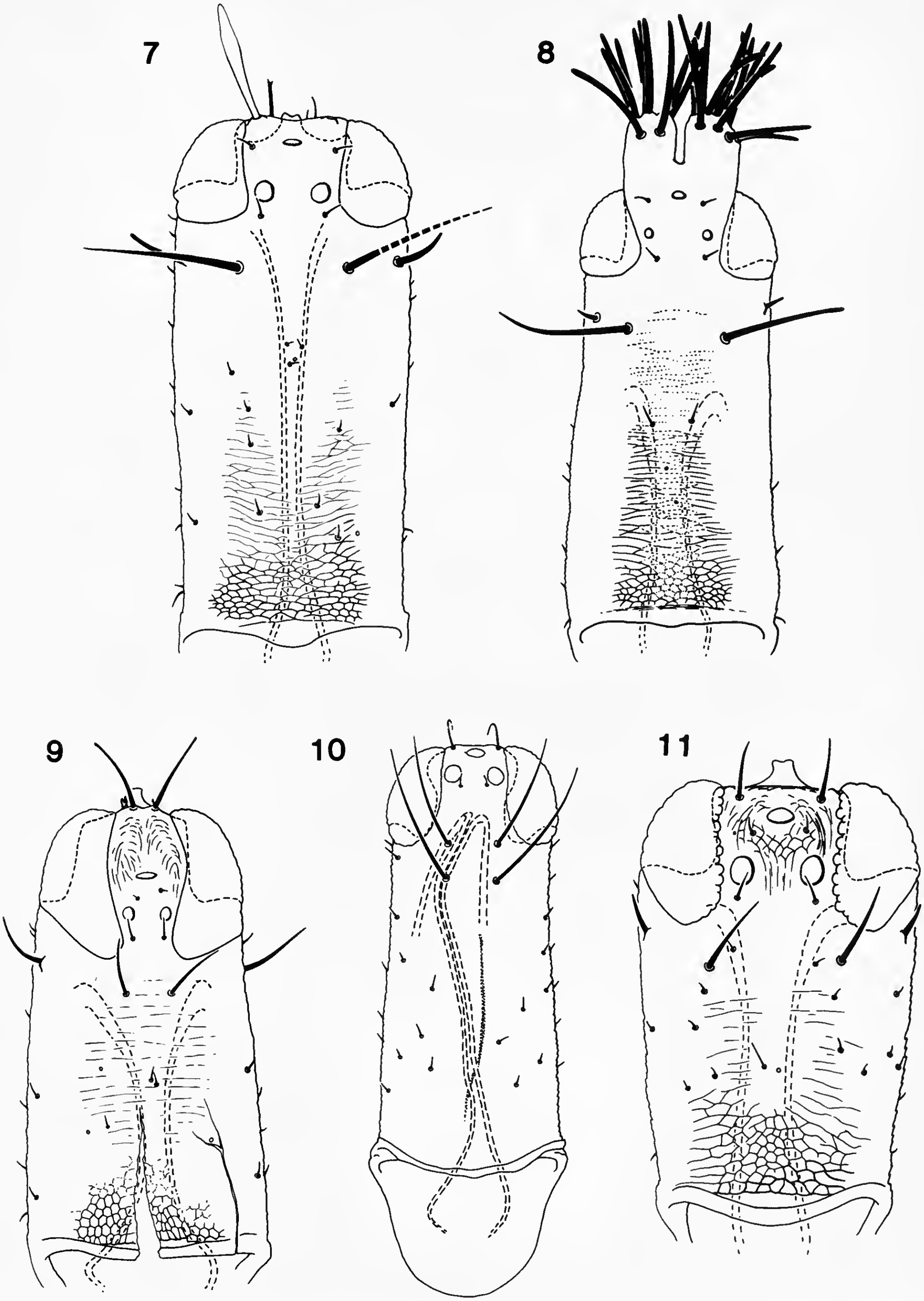
	NT	NA	PA	AT	O	A	P
Idolothrips	—	—	—	—	—	2	—
Meiothrips	—	—	—	—	3	—	—
Lasiothrips	—	—	—	—	—	1	—
Egchocephalothrips	—	—	—	—	—	—	1
Megalothrips	—	3	2	—	1	—	—
Bacillothrips	—	—	3	—	—	—	—
Bactrothrips	—	1	1	32	7	1	—
Megathrips	—	1	5	—	—	—	—
Ceuthothrips	—	1	—	—	—	—	—
Cylindrothrips	—	—	—	1	—	—	—

Table 14 Distribution of species in Hystricothripina genera

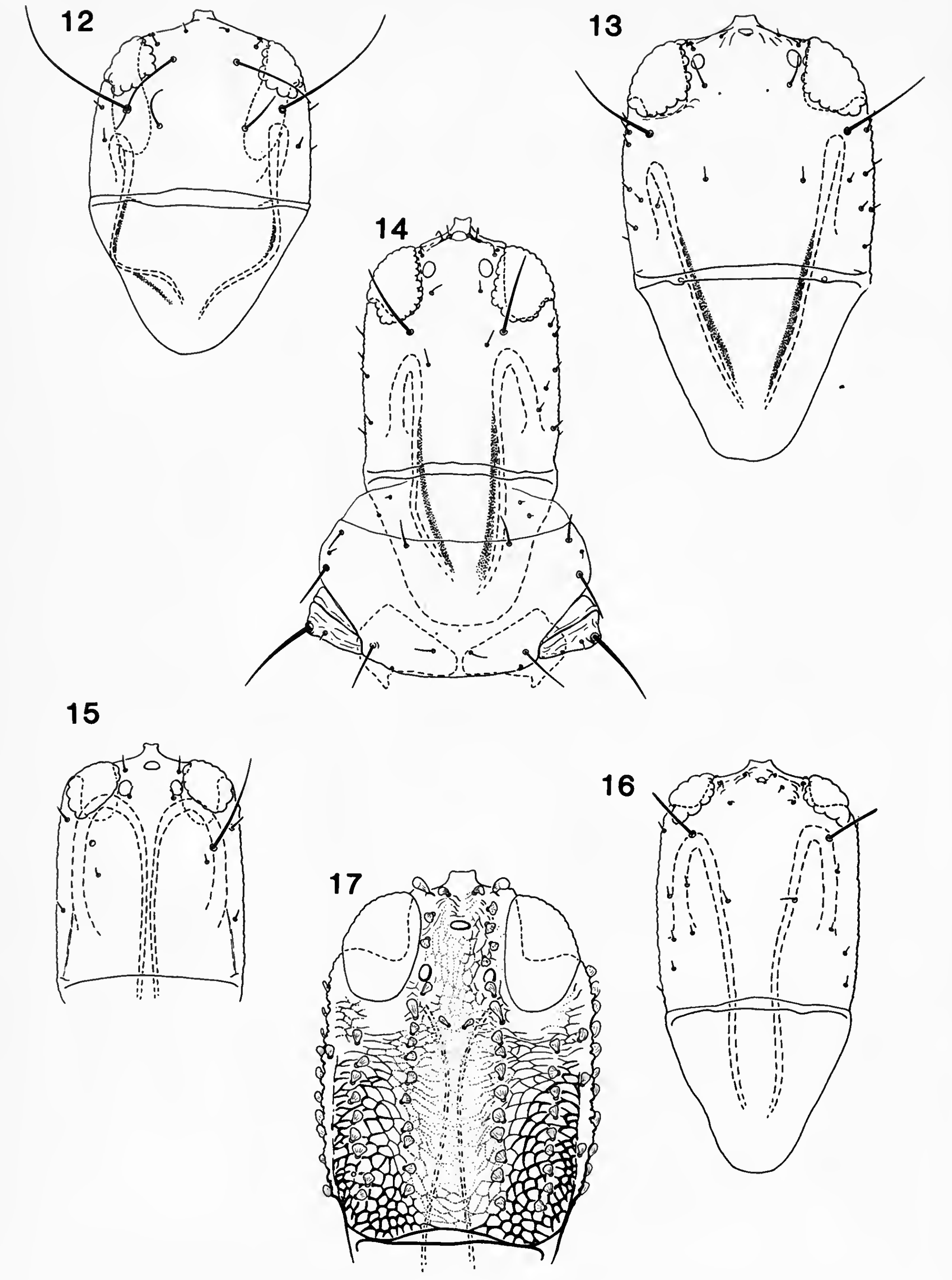
	NT	NA	PA	AT	O	A	P
Hystricothrips	—	—	—	2	—	—	—
Holurothrips	—	—	—	—	2	1	—
Paractinothrips	—	—	—	—	1	—	—
Neatractothrips	—	—	—	—	1	—	—
Actinothrips	11	—	—	—	—	—	—
Atractothrips	1	1	—	—	—	—	—
Azeugmatothrips	2	—	—	—	—	—	—
Cyphothrips	1	—	—	—	—	—	—
Hybridothrips	1	—	—	—	—	—	—
Saurothrips	1	—	—	—	—	—	—
Zactinothrips	2	—	—	—	—	—	—
Zeuglothrips	1	—	—	—	—	—	—
Zeugmatothrips	15	—	—	—	—	—	—



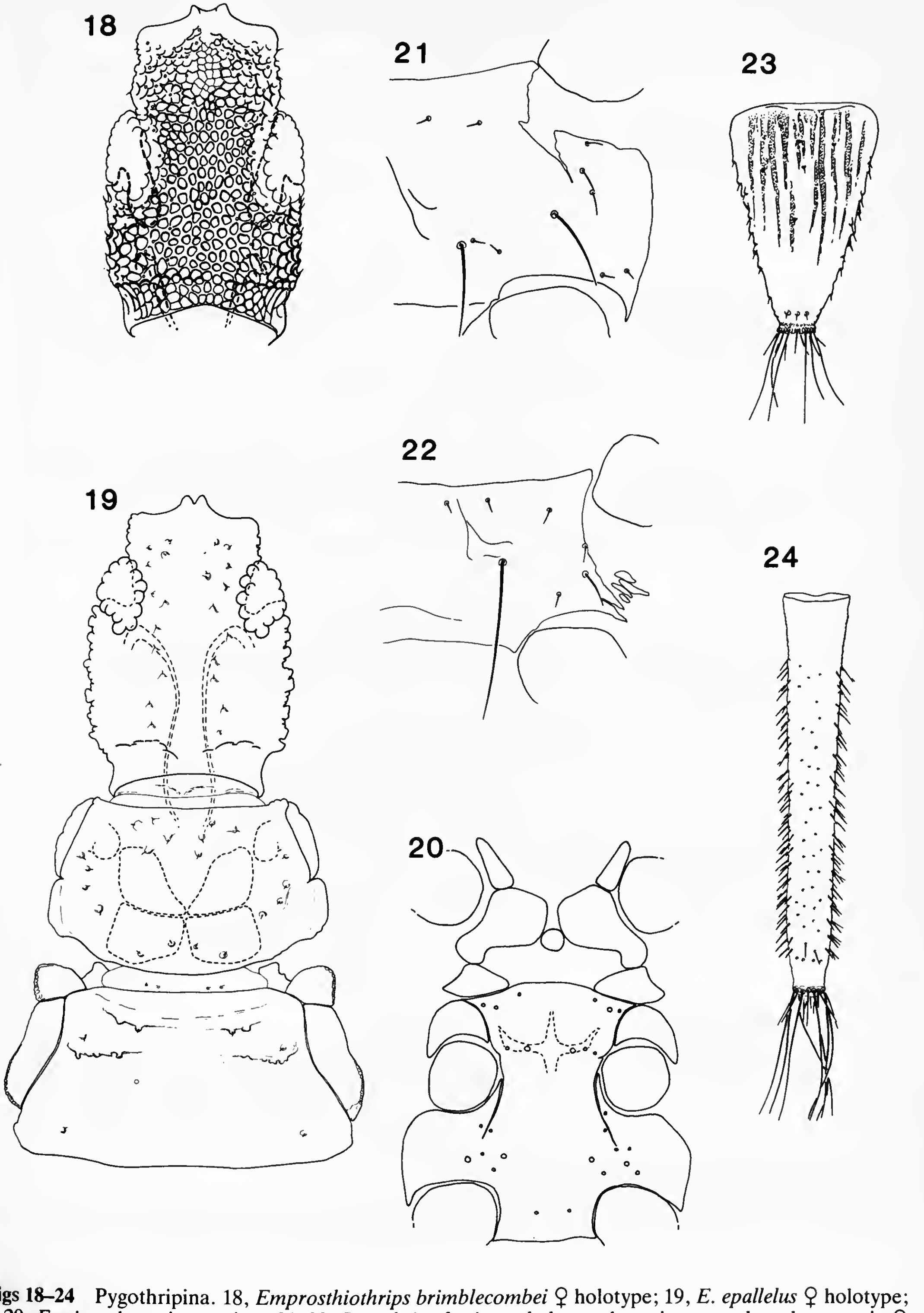
Figs 2–6 Pygothripina. 2, *Cryptothrips nigripes* mac.; 3, *Heptathrips magnifica* ♀ paratype; 4, *H. tonnoiri* ♀ mac.; 5, *Cleistothrips idolothripoides* ♀ mac.; 6, *Pygothrips fortis* ♂ apt.



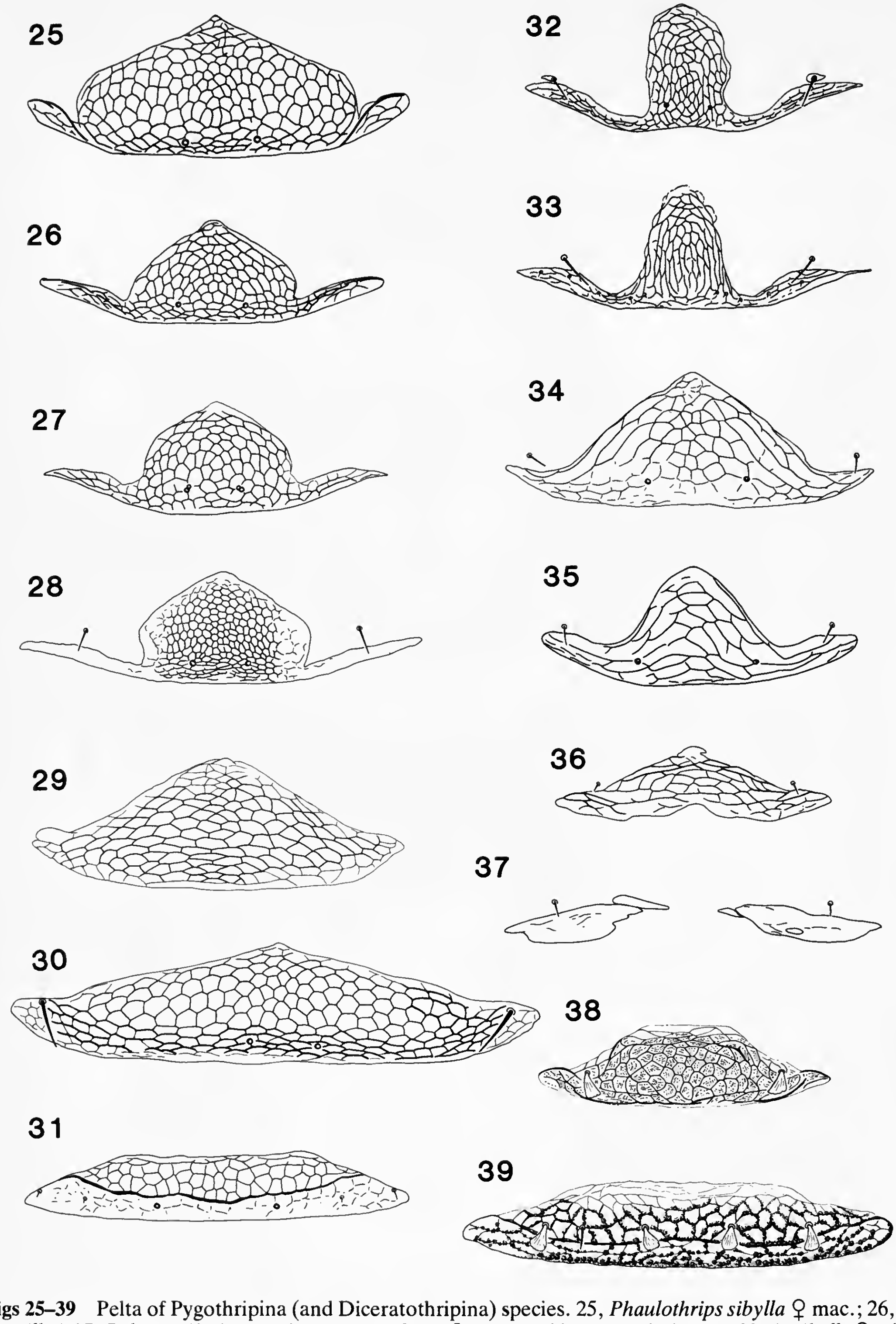
Figs 7–11 Pygothripina: *Phaulothrips* species. 7, *P. vuilleti* ♀; 8, *P. inquilinus* ♀; 9, *P. uptoni* ♀ holotype; 10, *P. magnificus* ♂ allotype; 11, *P. barretti* ♀ holotype.



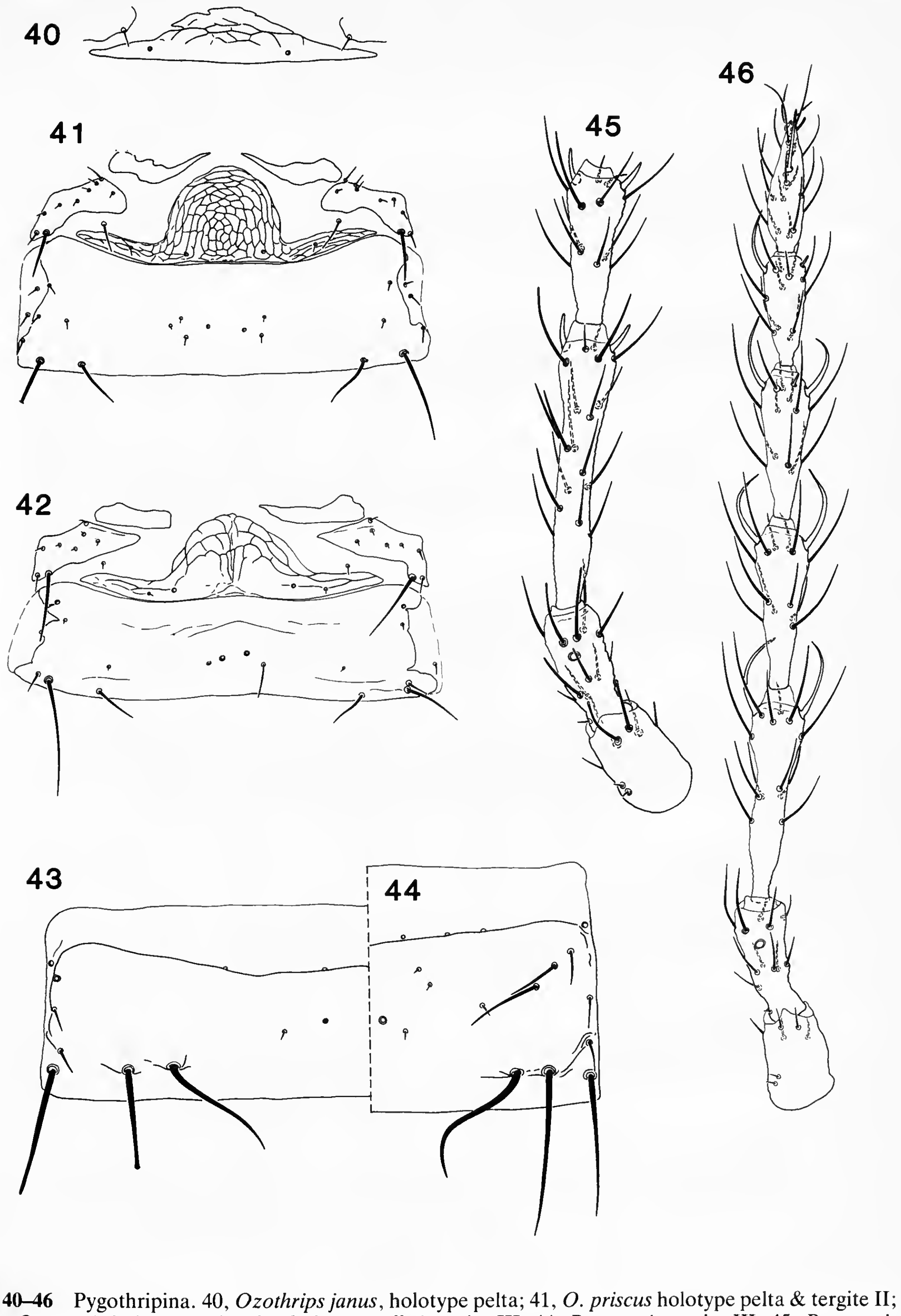
Figs 12–17 Pygothripina. 12, *Ozothrips janus* ♀ holotype; 13, *O. eurytis* ♀ holotype; 14, *O. priscus* ♀ holotype; 15, *Pygothrips mikrommatos* ♀ holotype; 16, *Priesneriana kabandha* ♀; 17, *Pelinothrips brochotus* ♀ holotype.



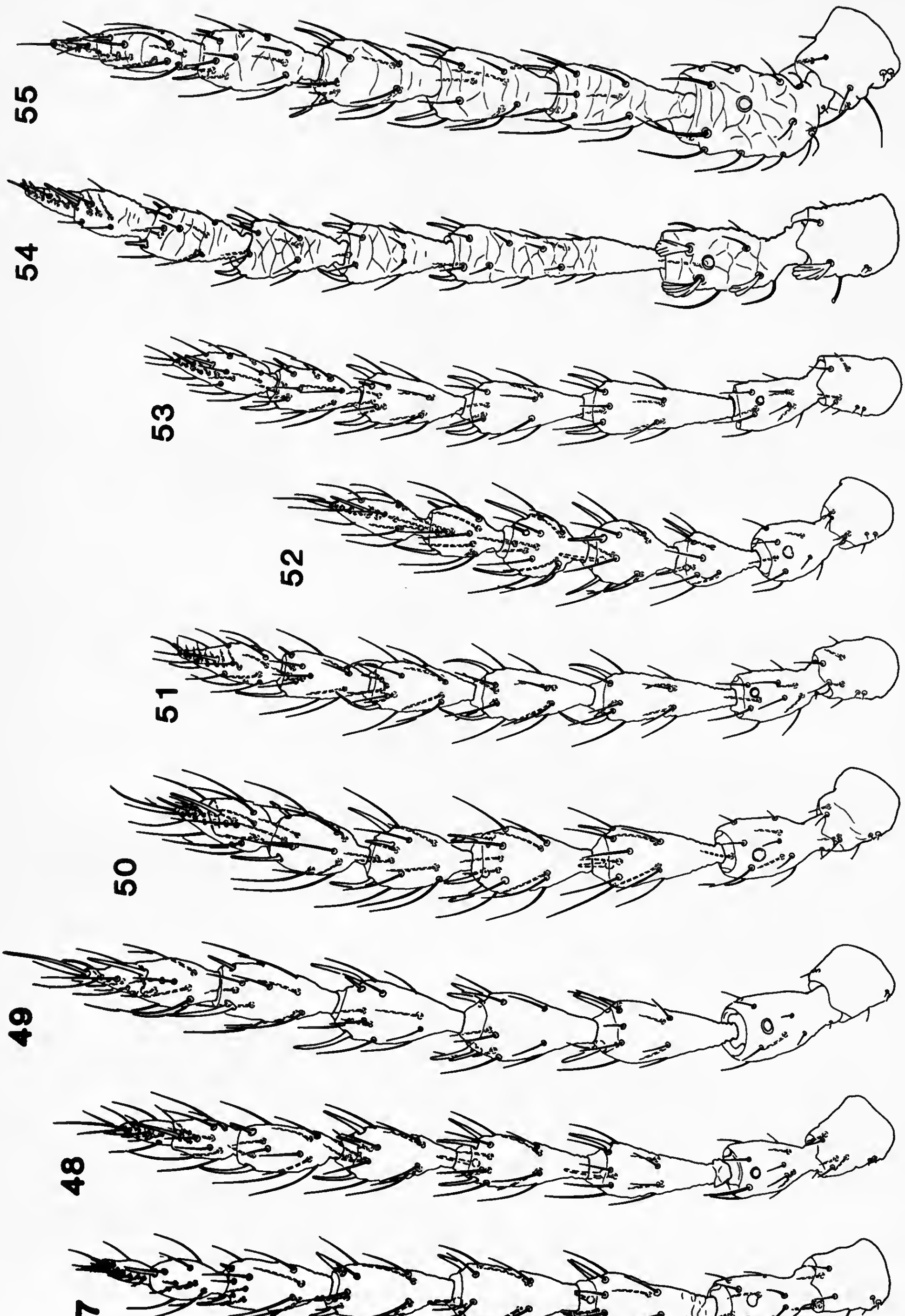
Figs 18–24 Pygothripina. 18, *Emprosthiothrips brimblecombei* ♀ holotype; 19, *E. epallelus* ♀ holotype; 20, *E. niger* thoracic sternites; 21–22, *Pygothrips fortis* eroded metathoracic sternopleural sutures in ♀ (21) and ♂ (22); 23, *P. fortis* ♂ tube; 24, *Cleistothrips idolothripoides* ♀ tube.



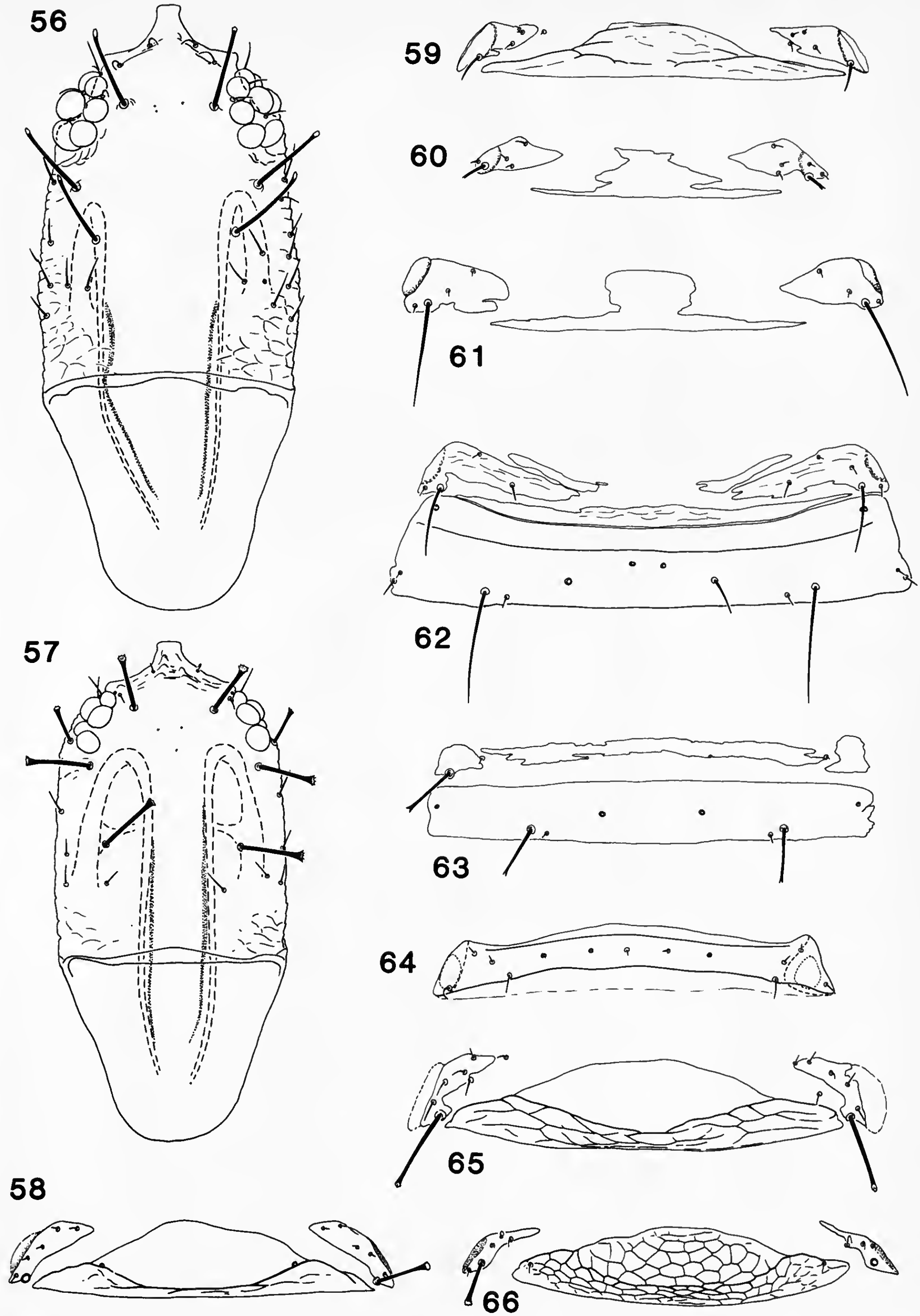
Figs 25–39 Pelta of Pygothripina (and Diceratothripina) species. 25, *Phaulothrips sibylla* ♀ mac.; 26, *P. vuilleti*; 27, *P. barretti* holotype; 28, *P. magnificus* ♂ allotype; 29, *P. anici* holotype; 30, *P. sibylla* ♀ mic.; 31, *Emprosthiothrips niger*; 32, *Cleistothrips idolothripoides*; 33, *Heptathrips tonnoiri*; 34, *Cryptothrips nigripes*; (35, *Diceratothrips nigricauda*;) 36, *Phaulothrips sculpticauda* ♀; 37, *P. sculpticauda* ♂ holotype; 38, *Pelinothrips brochotus* holotype; 39, *P. ornatus*.



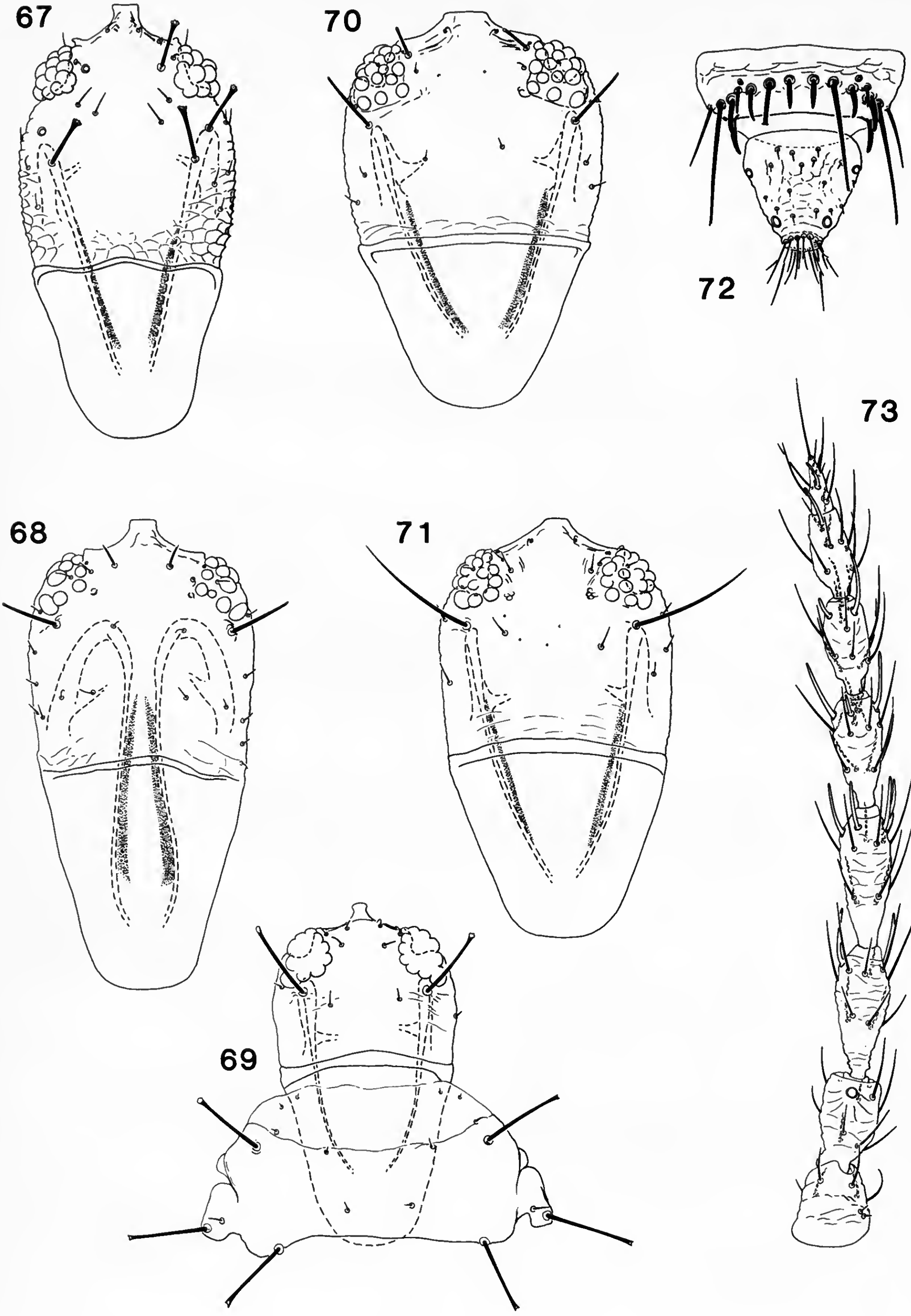
Figs 40–46 Pygothripina. 40, *Ozothrips janus*, holotype pelta; 41, *O. priscus* holotype pelta & tergite II; 42, *O. eurytis* holotype; 43, *Phaulothrips vuilleti* tergite III; 44, *P. agrestis* tergite III; 45, *P. agrestis* antennal segments I–IV; 46, *Cleistothrips idolothripoides*.



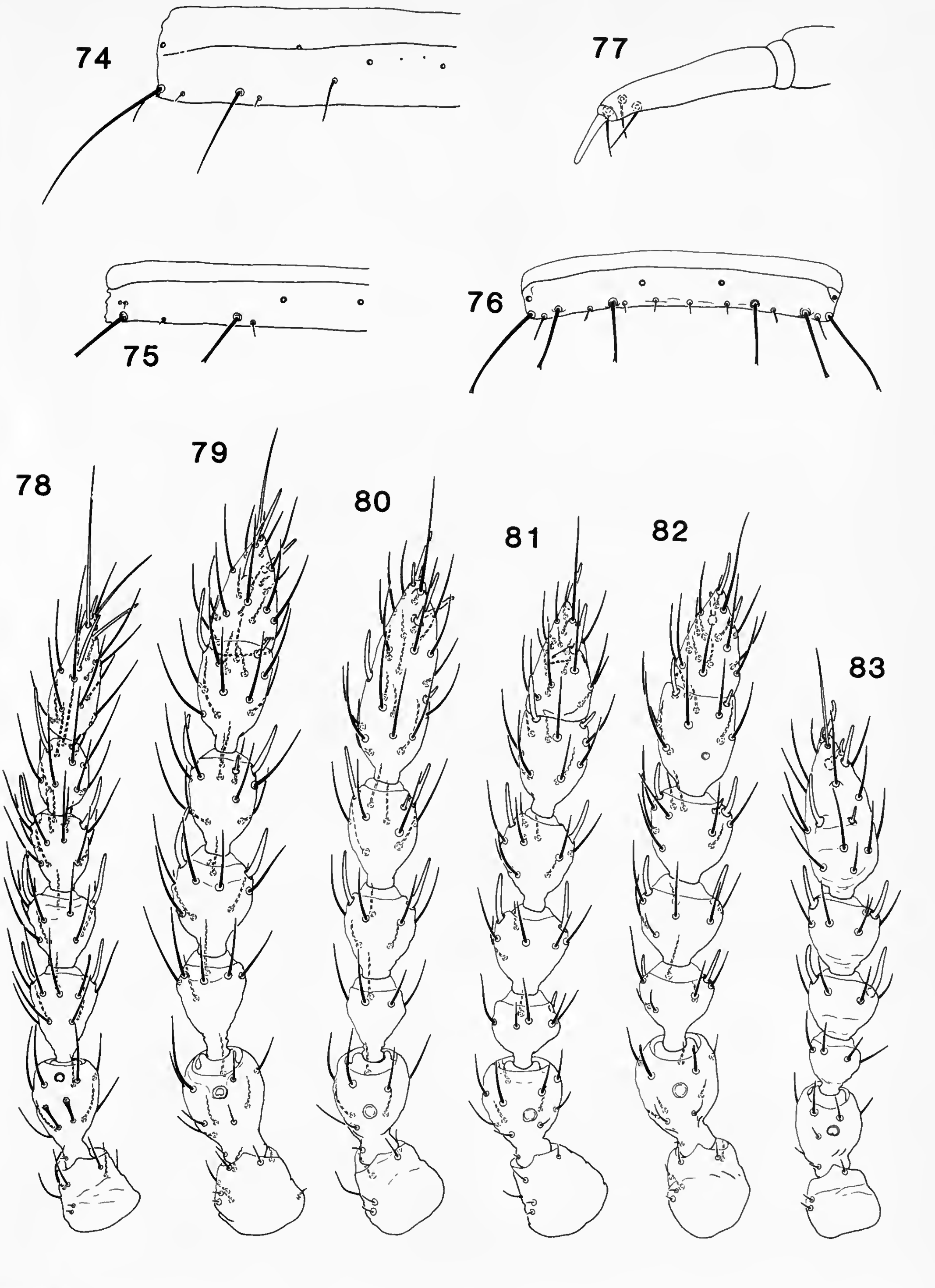
Figs 47–55 Pygothripina. 47, *Cryptothrips nigripes* mac.; 48, *Priesneriana kabandha*; 49, *Pygothrips sculpticauda* ♀; 50, *Ozothrips eurytis* holotype; 51, *O. priscus* holotype; 52, *O. janus* holotype; 53, *Heptathrips tonnoiri*; 54, *Pelinothrips ornatus*; 55, *Emprosthiothrips niger*.



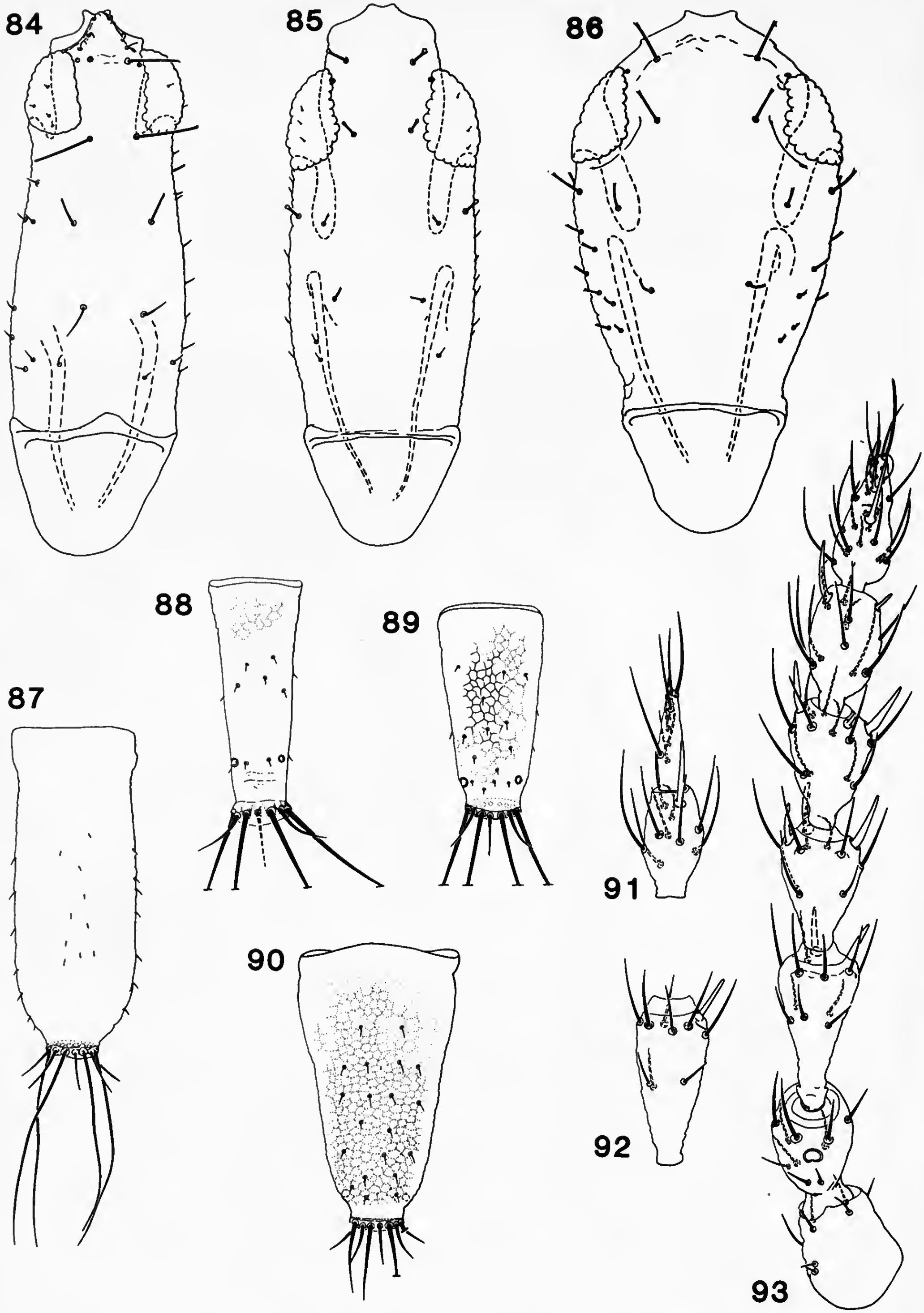
Figs 56–66 Allothripina. 56, *Pseudocryptothrips* sp.; 57, *Allothrips megacephalus stannardi*; 58, *A. m. stannardi* pelta; 59, *Priesneriella clavicornis*; 60, *P. thomasi*; 61, *P. citricauda*; 62, *P. gnomus* holotype pelta & tergite II; 63, *P. seminole* pelta & tergite II; 64, *Allidothrips tricolor* tergite I (pelta); 65, *Pseudocryptothrips* sp.; 66, *Faureothrips reticulatus*.



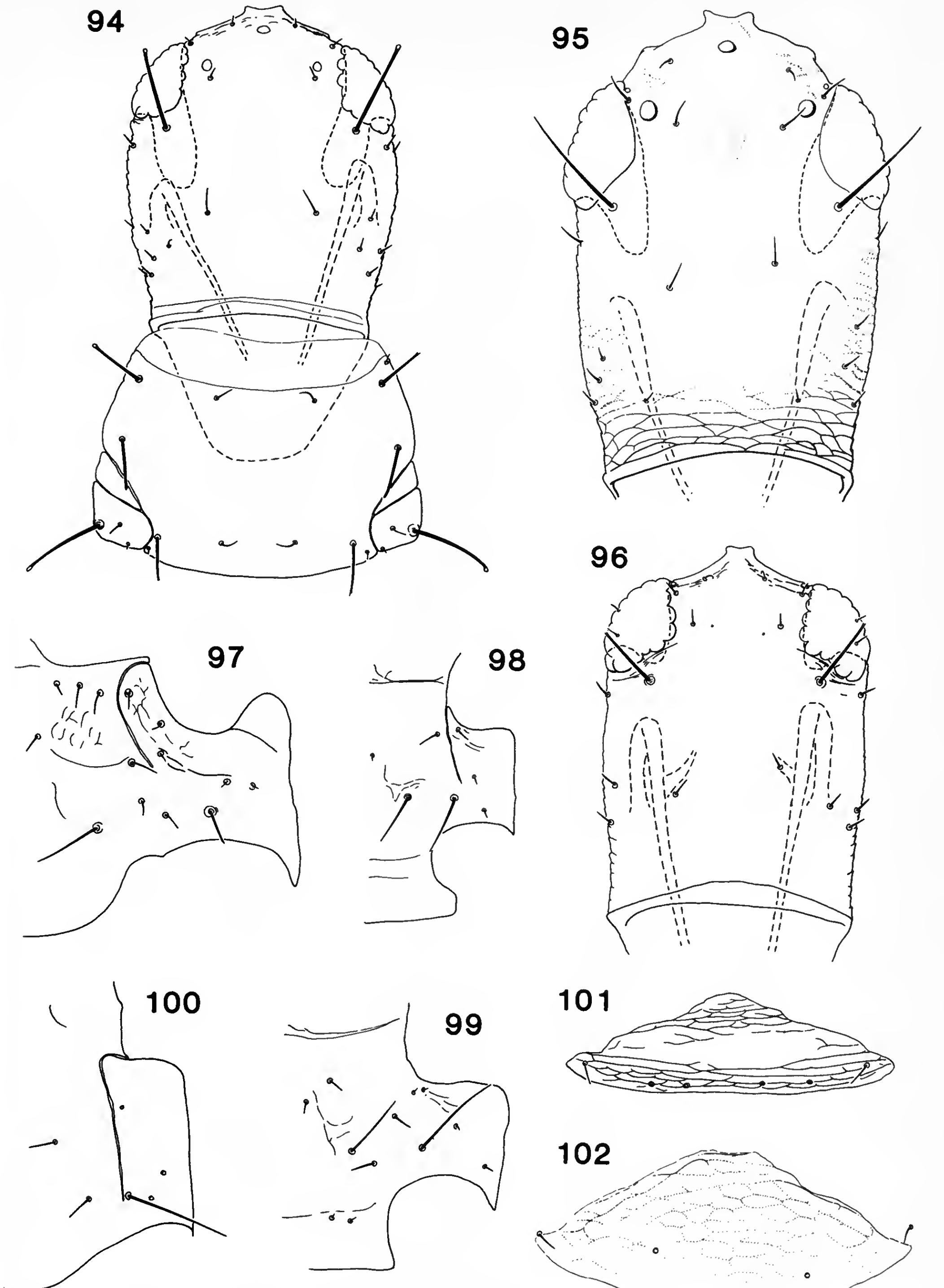
Figs 67–73 Allothripina. 67, *Faureothrips reticulatus*; 68, *Priesneriella thomasi*; 69, *P. seminole* head & pronotum; 70, *P. clavicornis*; 71, *P. gnomus* holotype; 72, *P. seminole* tergite IX & tube; 73, *Pseudocryptothrips* sp.



Figs 74–83 Allothripina. 74, *Priesneriella gnomus* tergite IV; 75, *P. seminole* tergite IV; 76, *P. seminole* tergite VII; 77, *Priesneriella* sp. left maxillary palp; 78, *Allothrips megacephalus stannardi*; 79, *Priesneriella gnomus*; 80, *P. citricauda*; 81, *P. clavicornis*; 82, *P. thomasi*; 83, *P. seminole*.

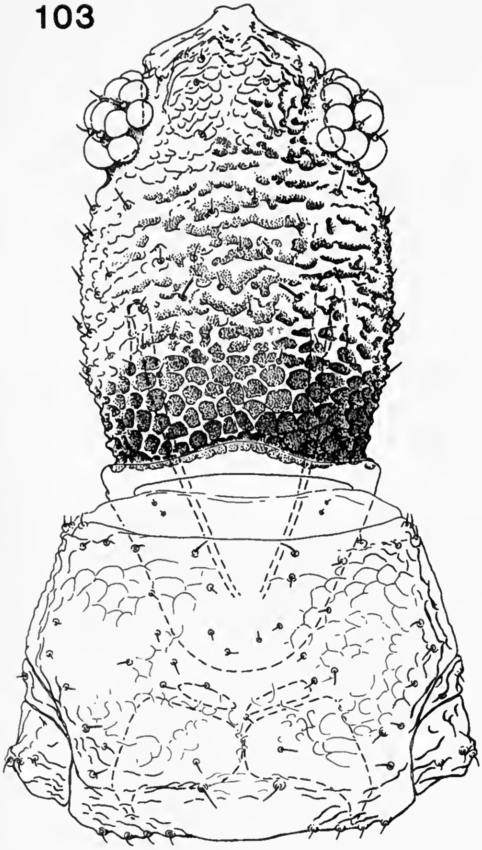


Figs 84–93 Compsothripina and Gastrothripina. 84, *Compsothrips albosignatus*; 85, *C. reuteri*; 86, *C. hookeri*; 87–90, tubes of (87) *Gastrothrips proturus* holotype; (88) *G. falcatus*; (89) *G. ruficauda*; (90) *G. intonsus*; 91, *G. ruficauda* antennal segments VII–VIII; 92, *G. ruficauda* antennal segment III; 93, *G. turbinatus*.

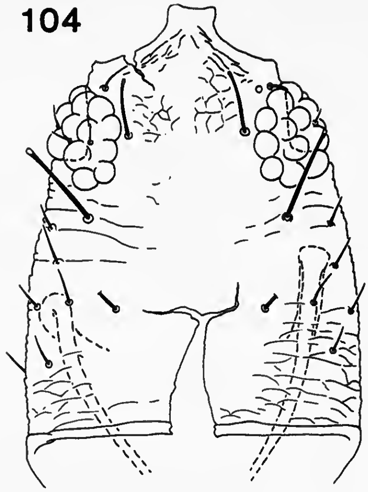


Figs 94–102 Compsothripina. 94, *Bolothrips bicolor*; 95, *B. italicus*; 96, *B. pratensis*; 97–100, metasternum of (97) *Anaglyptothrips dugdalei*; (98) *Bolothrips cingulatus*; (99) *B. icarus*; (100) *Compsothrips reuteri*; 101, *Bolothrips bicolor* pelta; 102, *B. italicus* pelta.

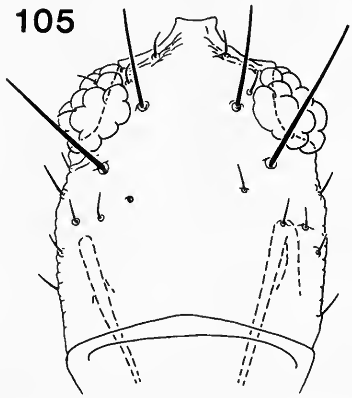
103



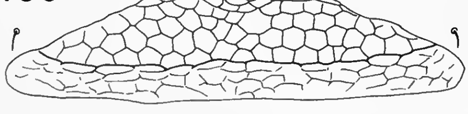
104



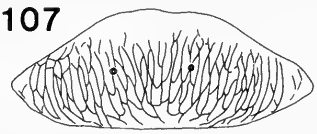
105



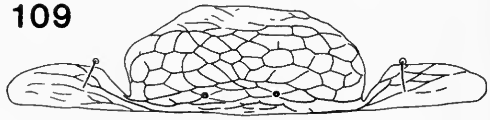
106



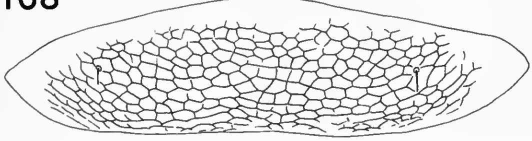
107



109

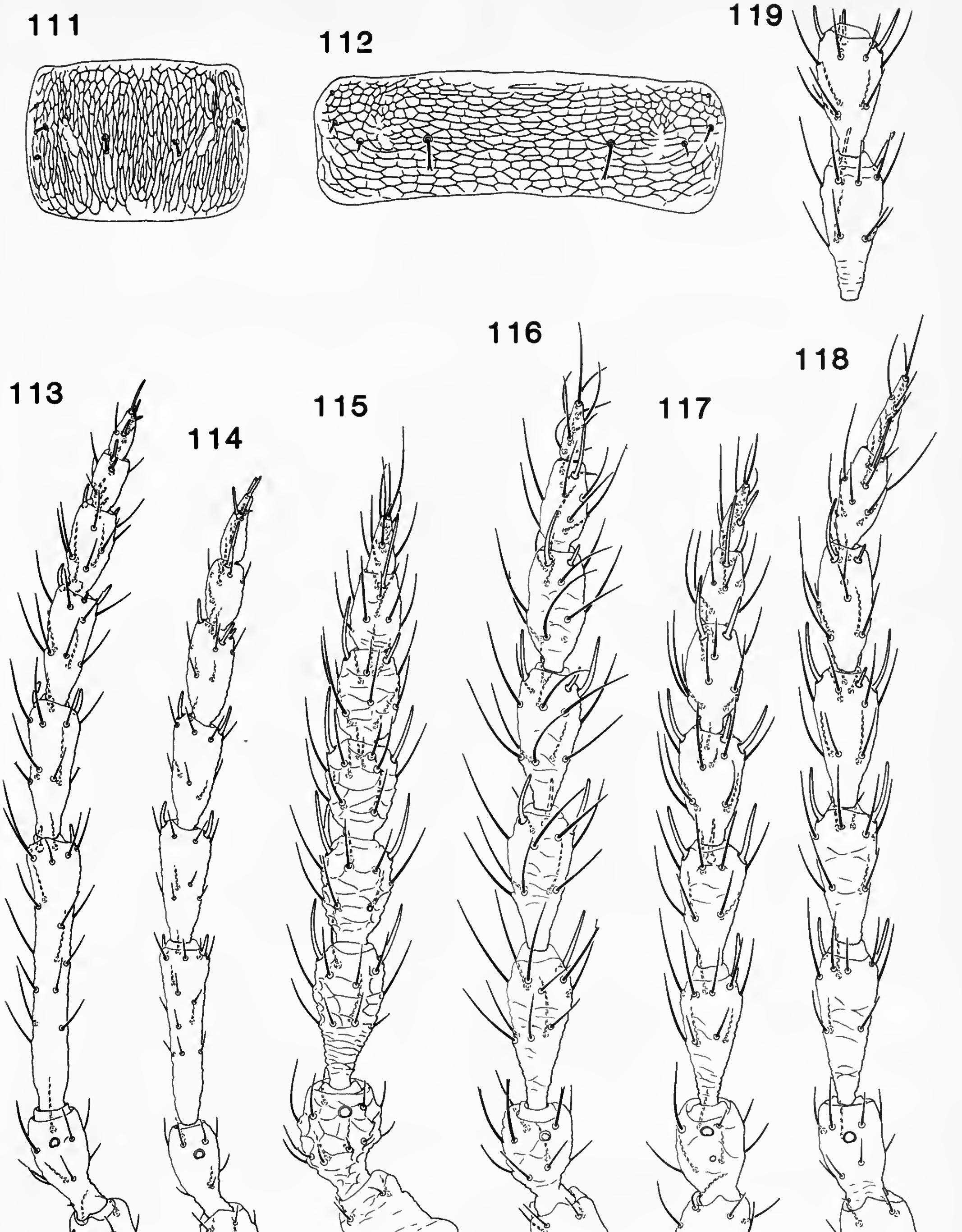


108

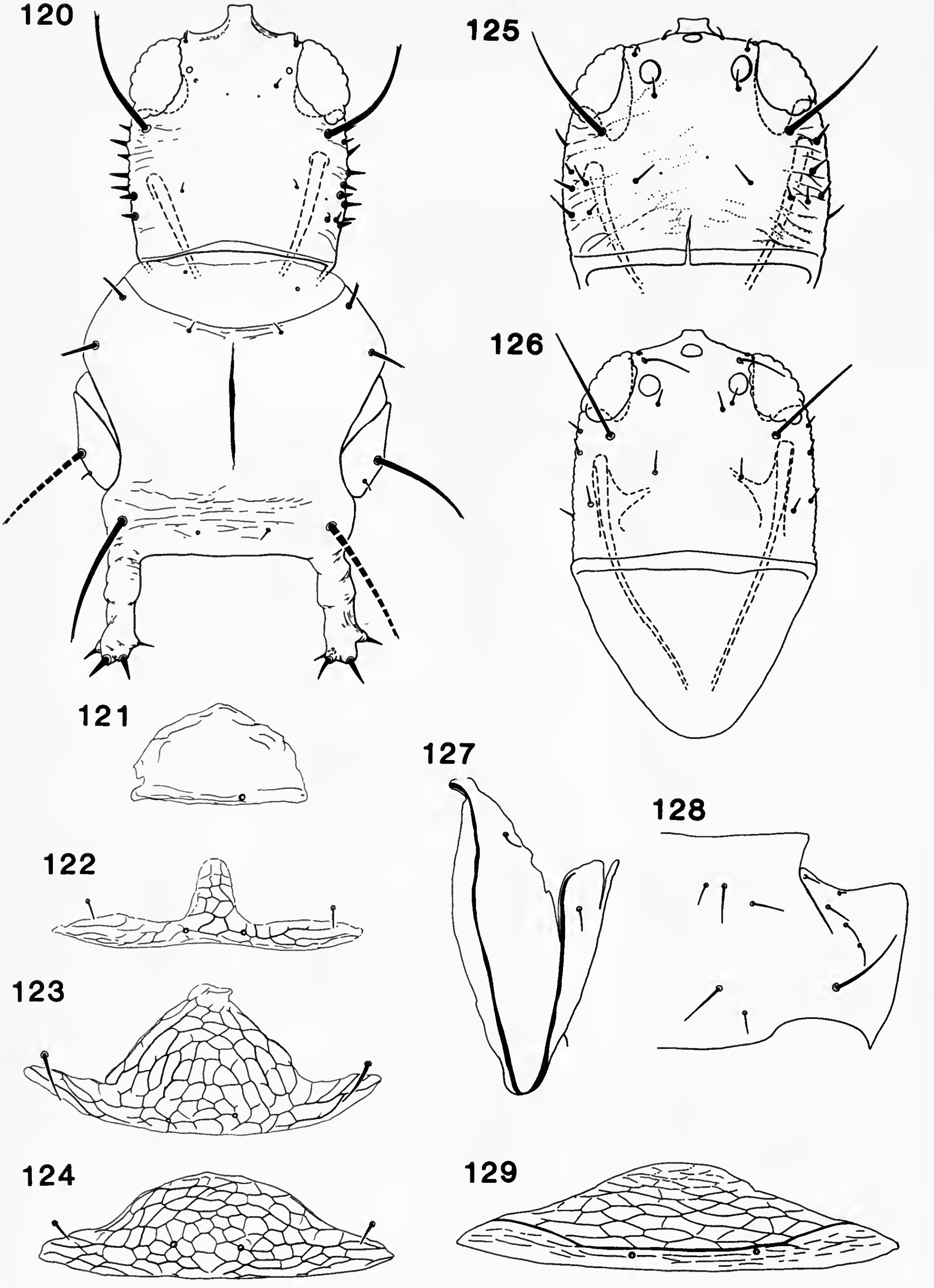


110

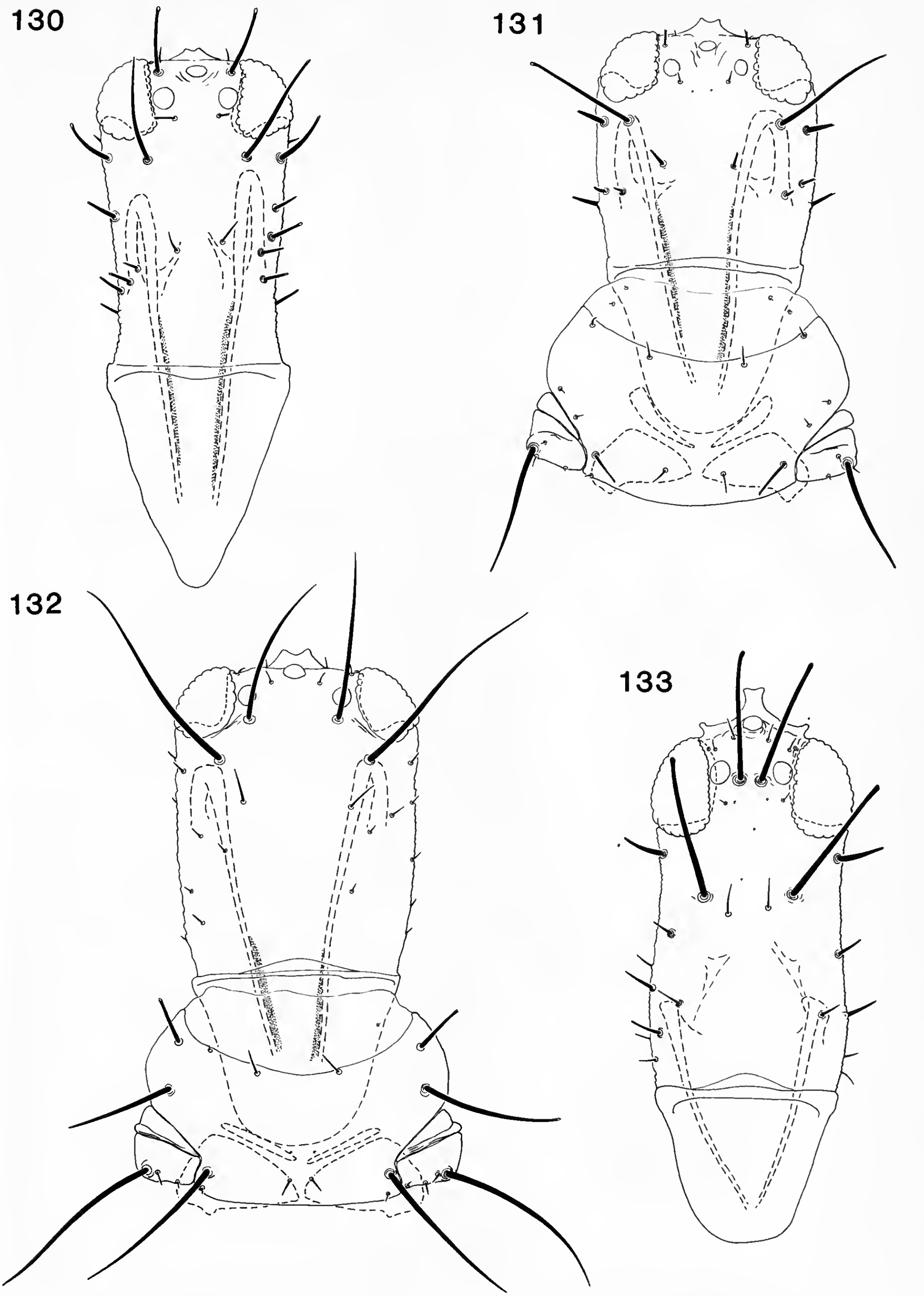
Figs 103–110 Compsothripina. 103. *Anaglyptothrips dugdalei* ♀; 104, *Illinothrips rossi* ♀; 105, *Loyolaia indica*; 106–110, pelta of (106) *Anaglyptothrips dugdalei*; (107) *Compsothrips reuteri*; (108) *C. albosignatus*; (109) *Loyolaia indica*; (110) *Illinothrips rossi*.



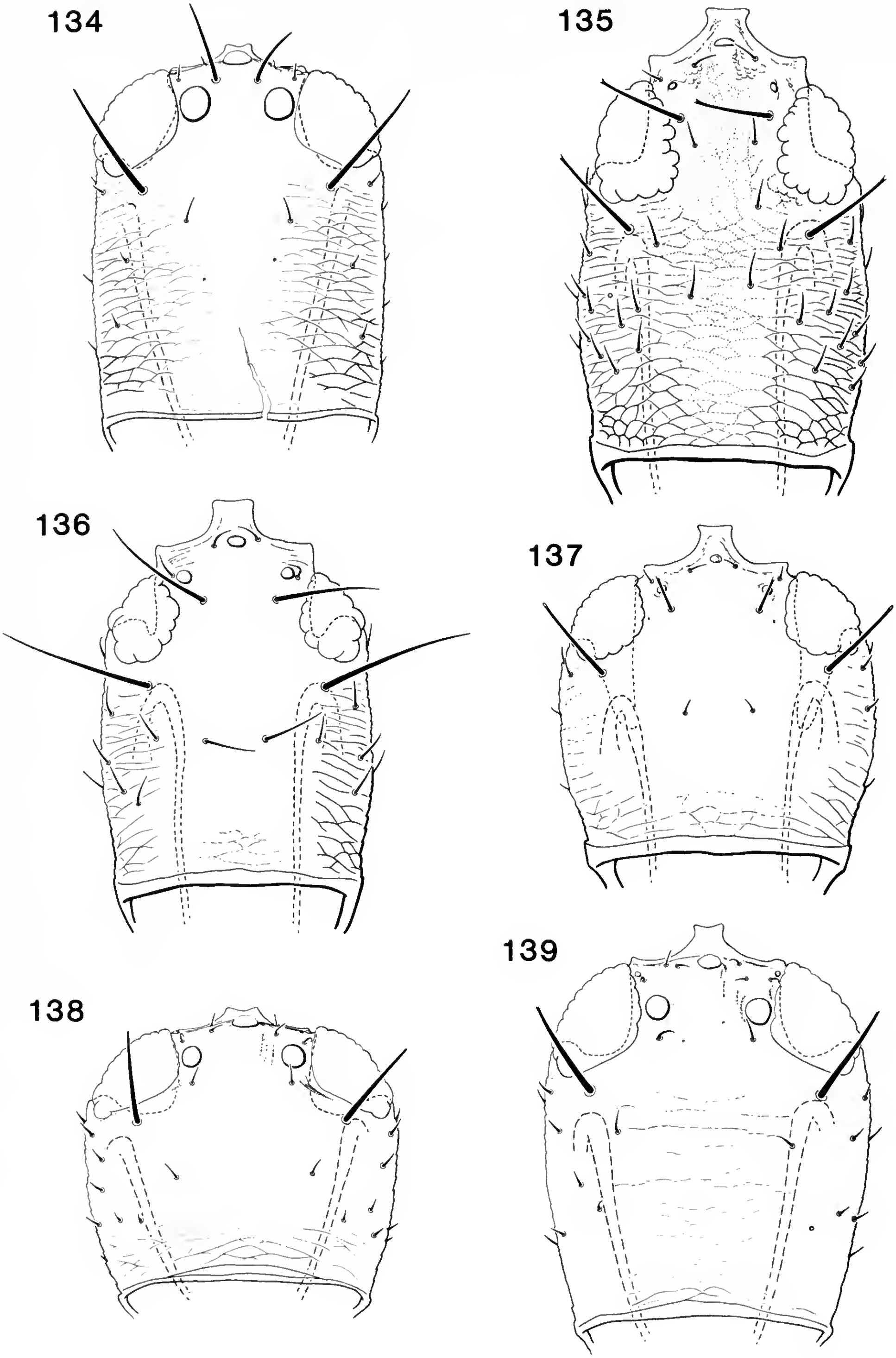
Figs 111–119 Compsothripina. 111, *Compsothrips reuteri* metanotum; 112, *C. albosignatus* metanotum; 113, *C. albosignatus*; 114, *C. reuteri*; 115, *Anaglyptothrips dugdalei*; 116, *Illinothrips rossi*; 117, *Loyolaia indica*; 118, *Bolothrips bicolor*; 119, *B. cingulatus* III–IV.



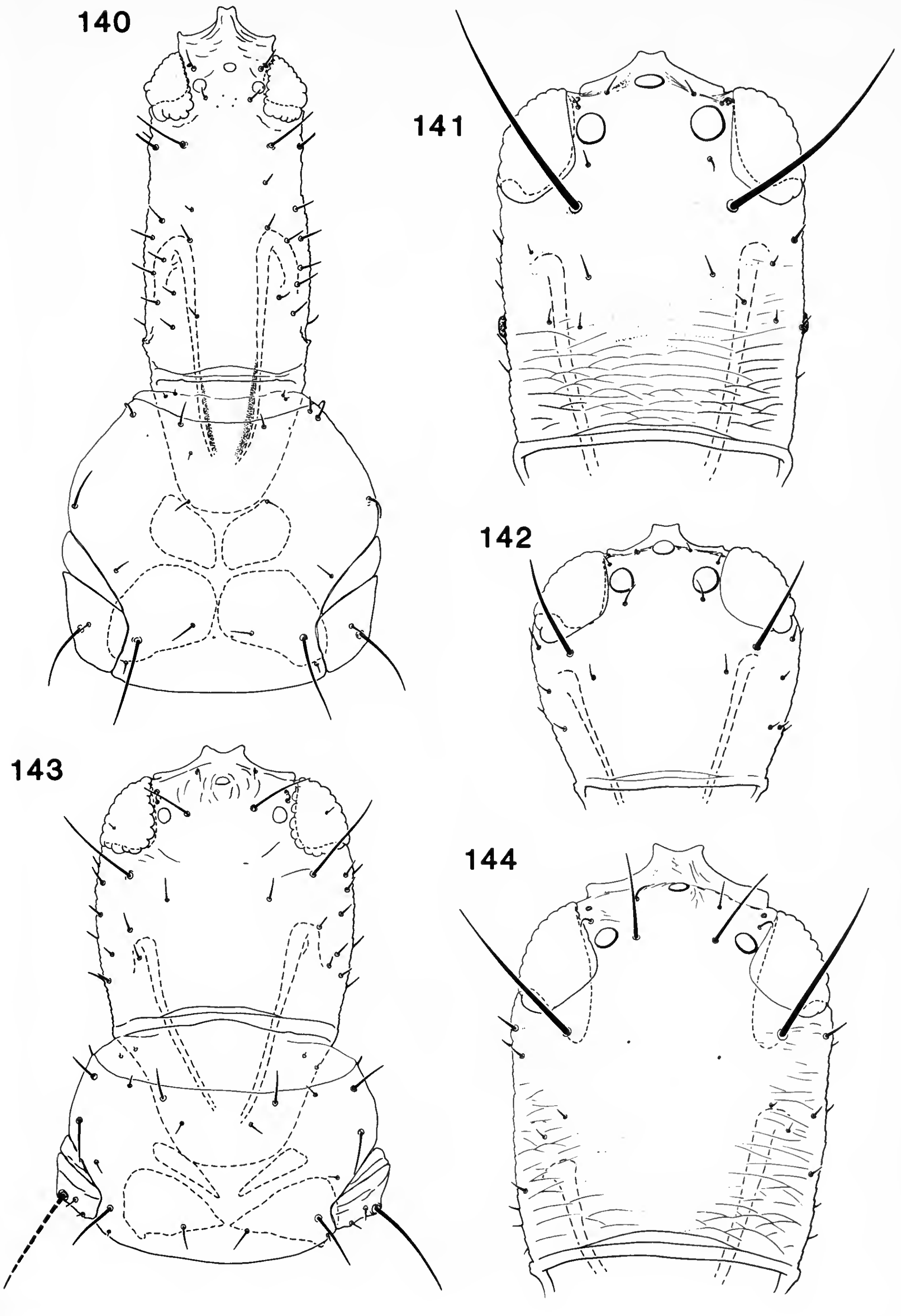
Figs 120–129 Gastrothripina. 120, *Gastrothrips anolis* ♂; 121–124, pelta of (121) *G. anolis*; (122) *G. ruficauda*; (123) *G. mandiocae*; (124) *G. intonsa*; 125, *G. ruficauda*; 126, *G. turbinatus*; 127, *G. mauli* anapleural suture; 128, *G. acuticornis* metasternum; 129, *G. fulviceps* pelta.



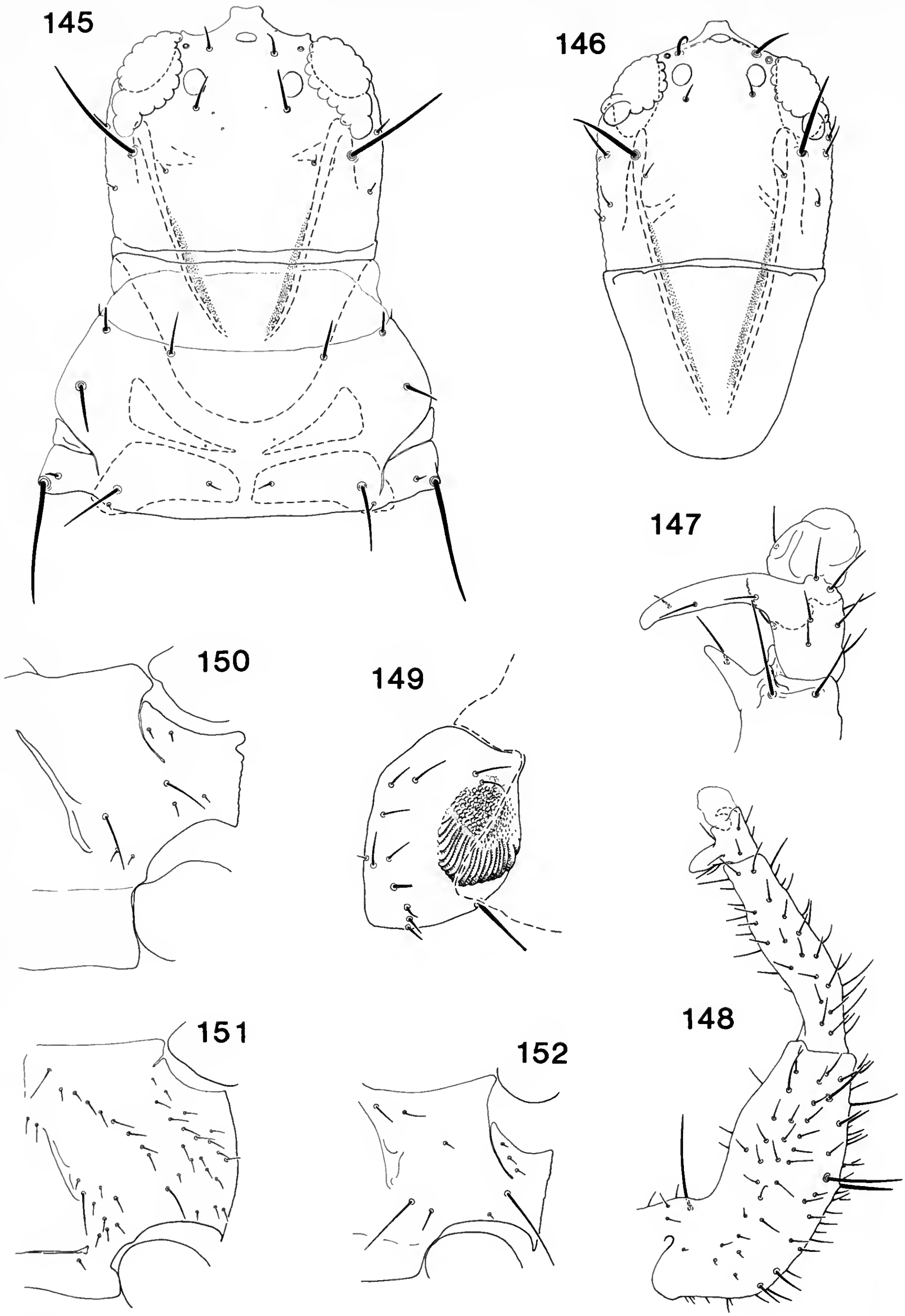
Figs 130–133 Diceratothripina. 130, *Diceratothrips bicornis* ♂; 131, *D. bennetti* ♀ paratype; 132, *Neosmerinthothrips hamiltoni* ♀ holotype; 133, *Campulothrips gracilis*.



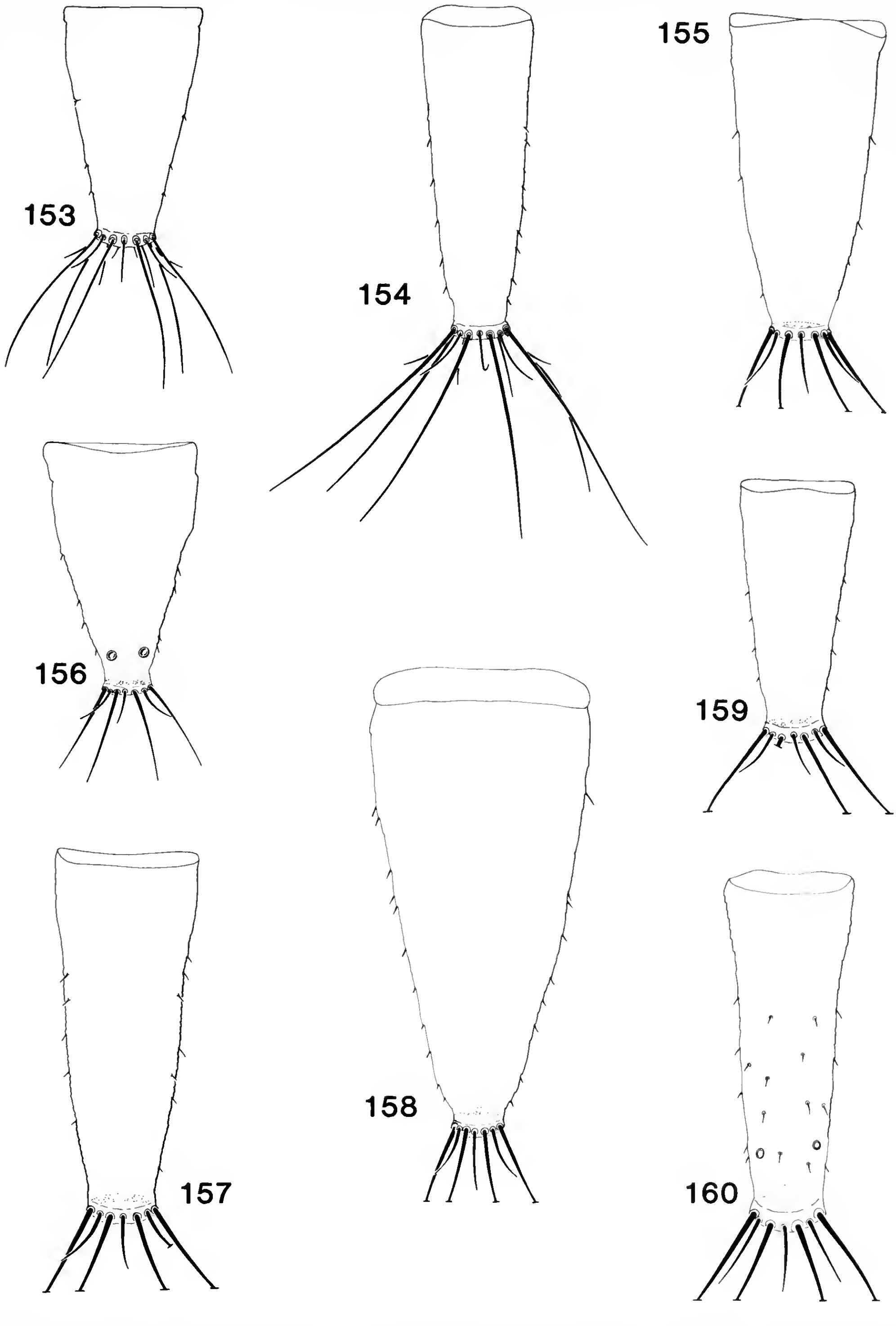
Figs 134–139 Diceratothripina. 134, *Nesidiothrips alius*; 135, *Carientothrips magnetis* holotype; 136, *C. loisthus* holotype; 137, *C. pedicillus* holotype; 138, *Neosmerinthothrips fructuum*; 139, *N. hilaris*.



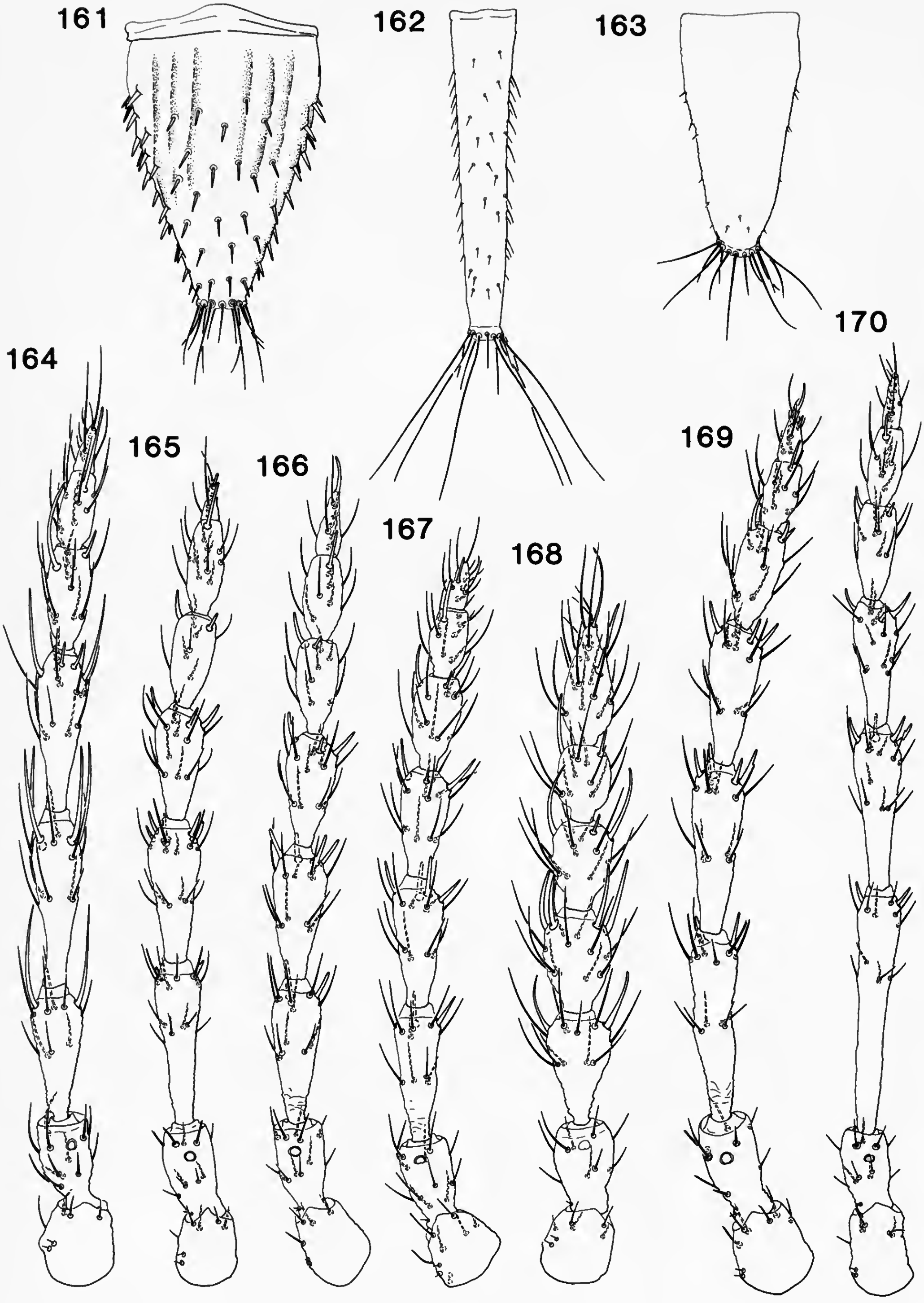
Figs 140–144 Diceratothripina. 140, *Sporothrips amplus* ♂; 141, *Phacothrips ocelloides*; 142, *Nesothrips malaccae*; 143, *N. rangi* ♀ holotype; 144, *N. eastopi* ♀ holotype.



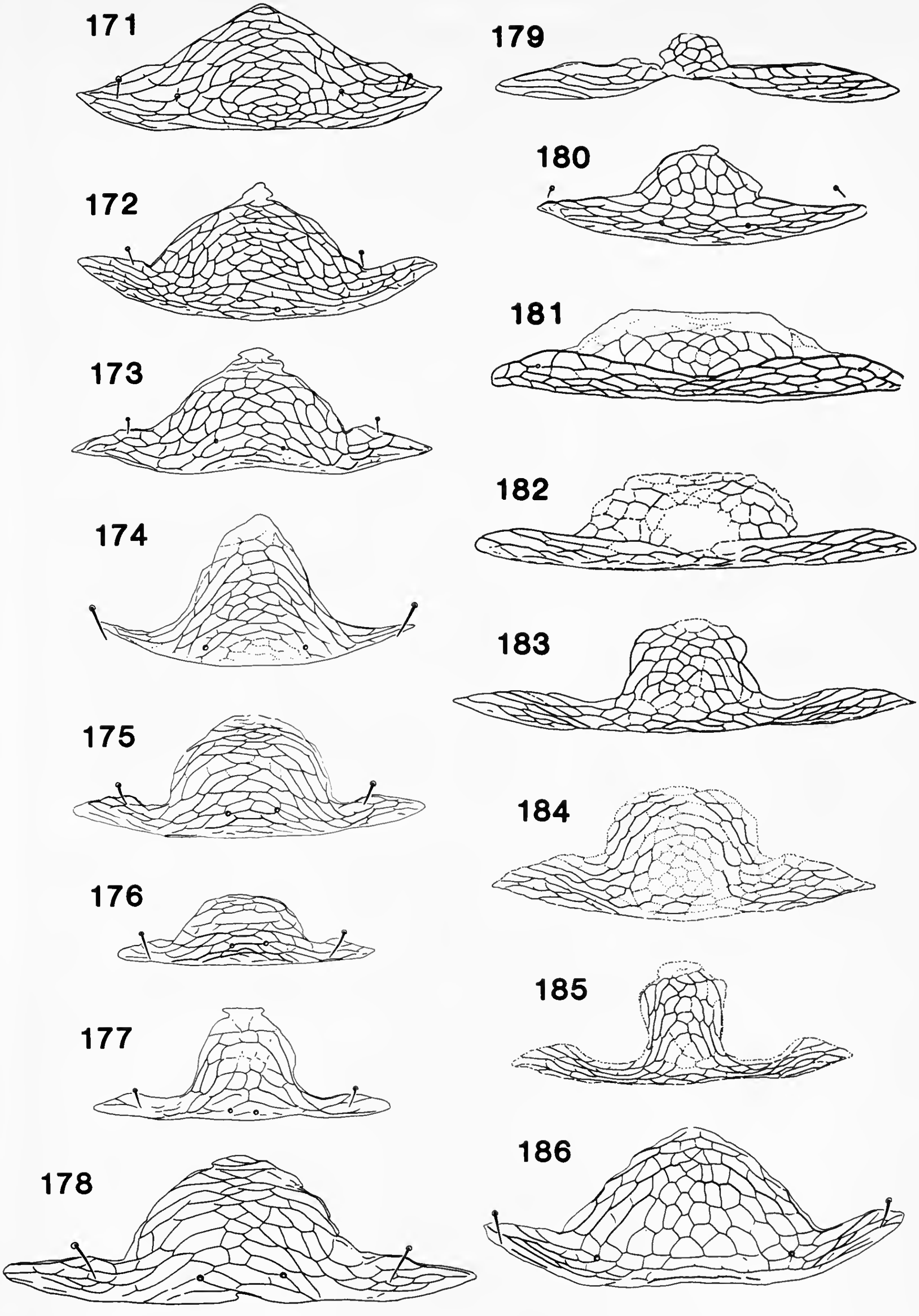
Figs 145–152 Diceratothripina. 145, *Acallurothrips spinicauda*; 146, *A. flavus* ♀ paratype; 147, *Sporothrips amplus* ♂ foretarsus; 148, *Campulothrips gracilis* ♂ foreleg; 149, *Diceratothrips bicornis* ♂ forecoxal stridulatory ridges; 150–152, metasternum of (150) *Sporothrips amplus*; (151) *Campulothrips gracilis*; (152) *Diceratothrips bennetti*.



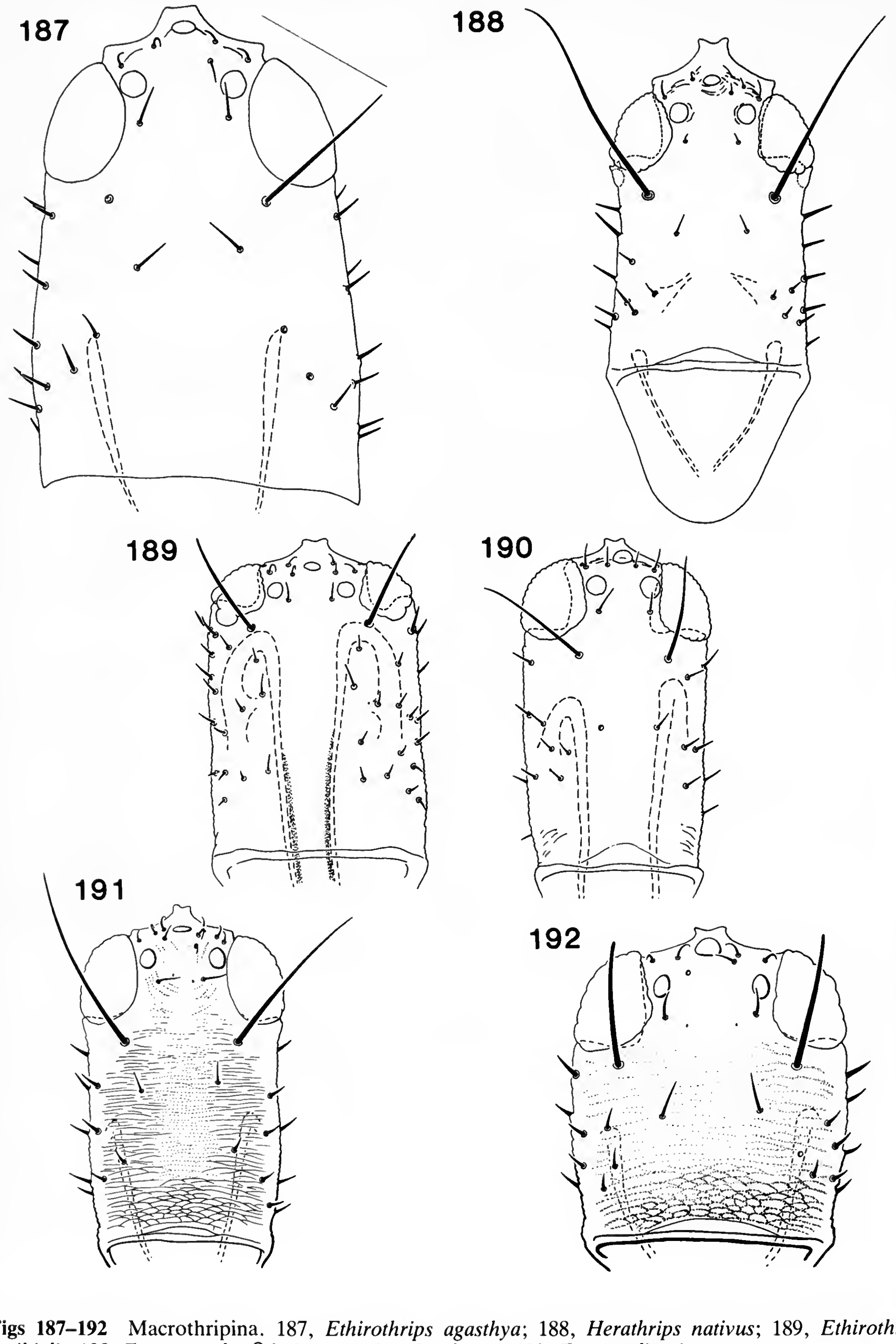
Figs 153–160 Diceratothripina tubes. 153, *Neosmerinthothrips hoodi*;154, *N. hamiltoni*; 155, *N. variipes*; 156, *N. xylebori*; 157, *Nesidiothrips alius*; 158, *Phacothrips ocelloides*; 159, *Nesothrips brevicollis*; 160, *N. eastopi*.



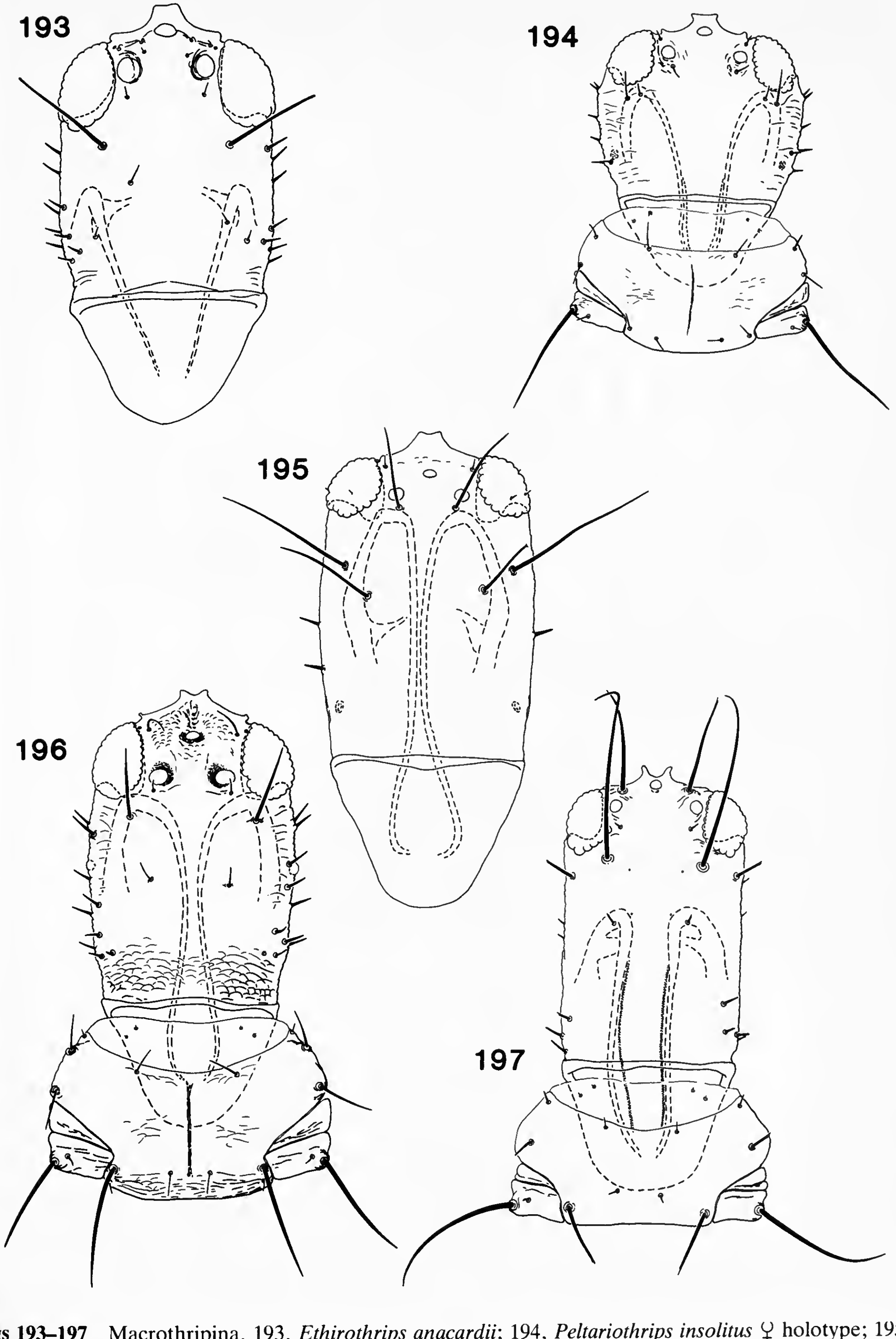
Figs 161–170 Diceratothripina. 161, *Acallurothrips spinicauda* tube; 162, *Campulothrips gracilis* tube; 163, *Diceratothrips bennetti* ♀ tube; 164, *Carientothrips grayi*; 165, *Diceratothrips bennetti* ♀; 166, *Phacothrips ocelloides*; 167, *Nesothrips rangi* ♀ holotype; 168, *Acallurothrips flavus*; 169, *Neosmerinthothrips hamiltoni* ♀ holotype; 170, *Sporothrips amplus*.



Figs 171–186 Pelta of Diceratothripina species. 171, *Diceratothrips bennetti* ♂ holotype; 172, *Neosmerinthothrips hamiltoni* ♀ holotype; 173, *N. fructuum*; 174, *Nesidiothrips alius*; 175, *Nesothrips brevicollis*; 176, *N. fodinae*; 177, *N. leveri*; 178, *N. rangi* ♀ holotype; 179, *Acallurothrips badius*; 180, *A. flavus*; 181, *Carientothrips acti*; 182, *C. mjobergi* ♀ apt.; 183, *C. mjobergi* ♀ mic.; 184, *C. magnetis*; 185, *C. mjobergi* ♀ mac.; 186, *Phacothrips ocelloides*.



Figs 187–192 Macrothripina. 187, *Ethirothrips agasthya*; 188, *Herathrips nativus*; 189, *Ethirothrips tibialis*; 190, *E. stenomelas* ♀ holotype; 191, *E. sybarita*; 192, *E. australiensis*.



Figs 193–197 Macrothripina. 193, *Ethirothrips anacardii*; 194, *Peltariothrips insolitus* ♀ holotype; 195, *Polytrichothrips laticeps* ♀ holotype; 196, *Tarassothrips akritus* ♀ holotype; 197, *Diplacothrips piceus*.

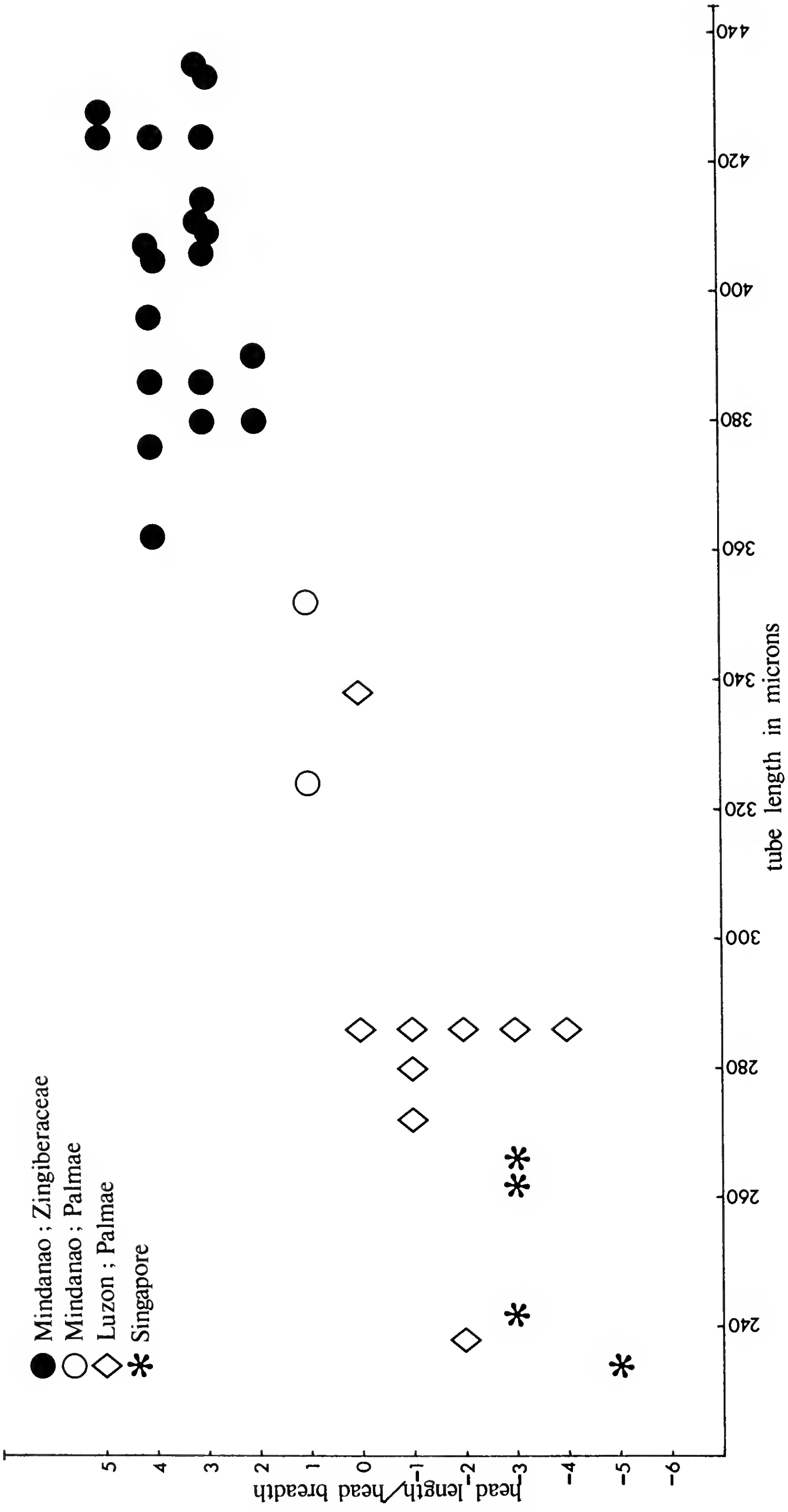
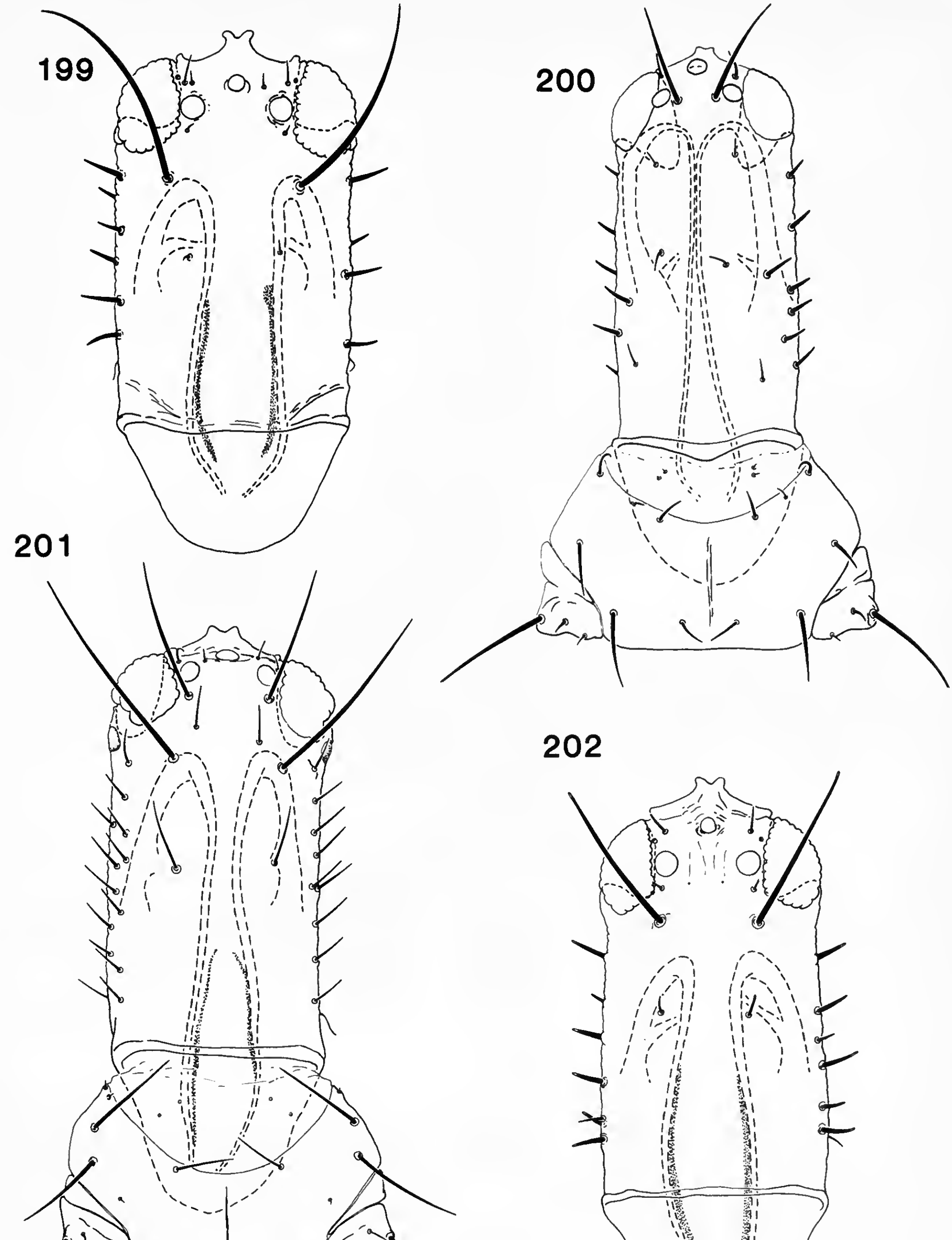
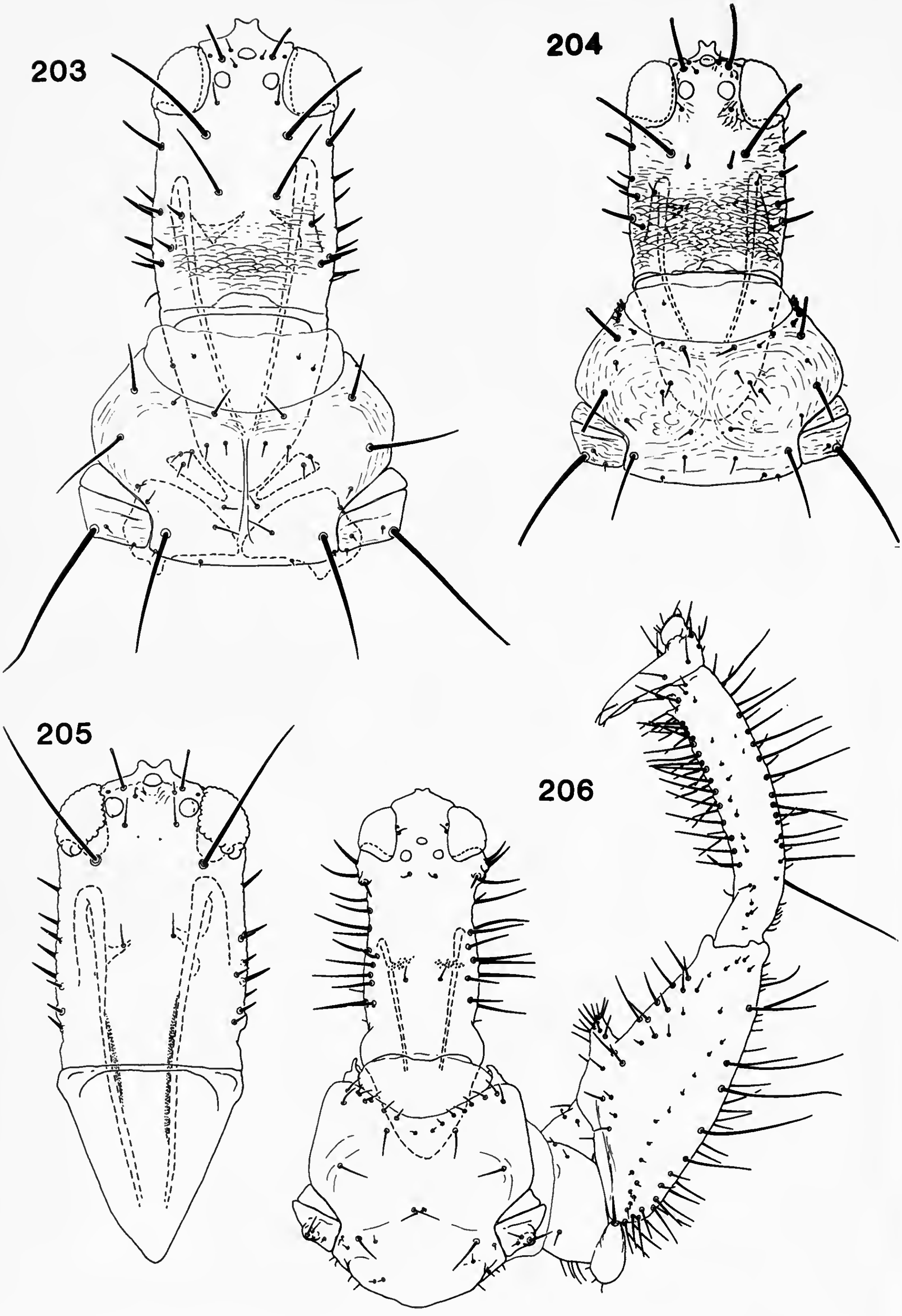


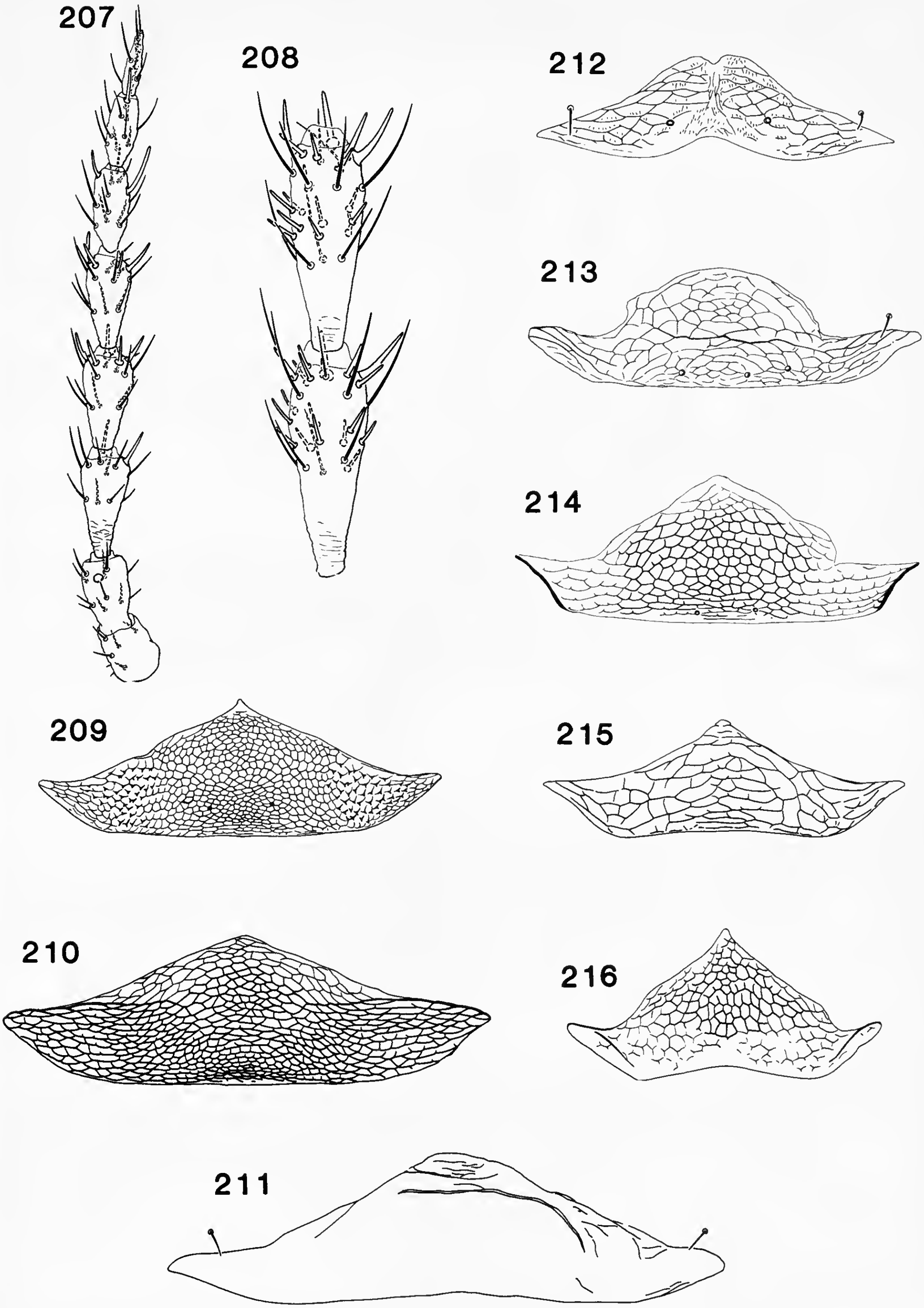
Fig. 198 *Peltariothrips insolitus*, variation in females from Singapore and the Philippines.



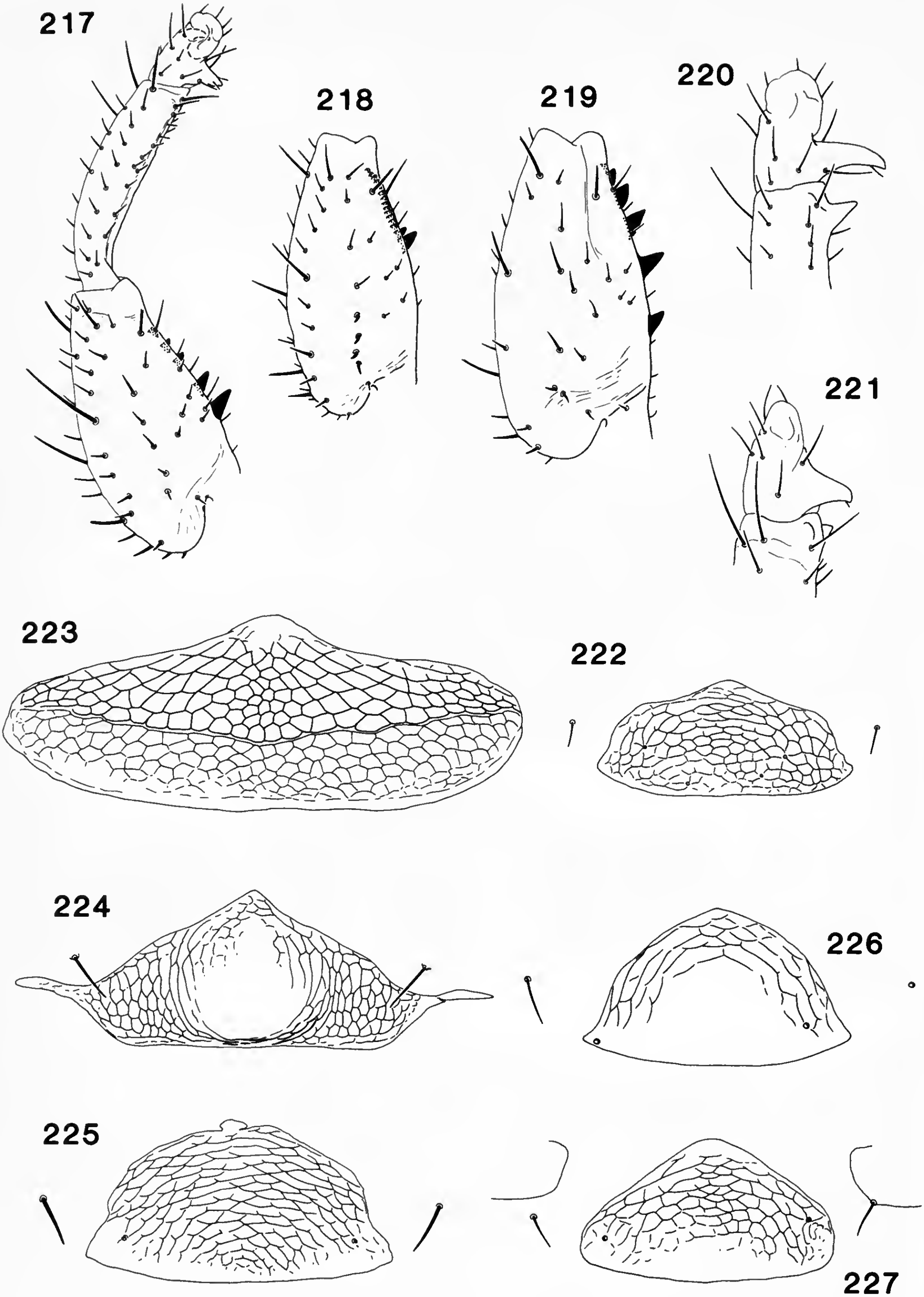
Figs 199–202 Macrothripina. 199, *Dichaetothrips secutor* ♀ holotype; 200, *Aesthesiothrips jatrophae*; 201, *Celidothrips lawrencei*; 202, *Dichaetothrips okajimai* ♀ holotype.



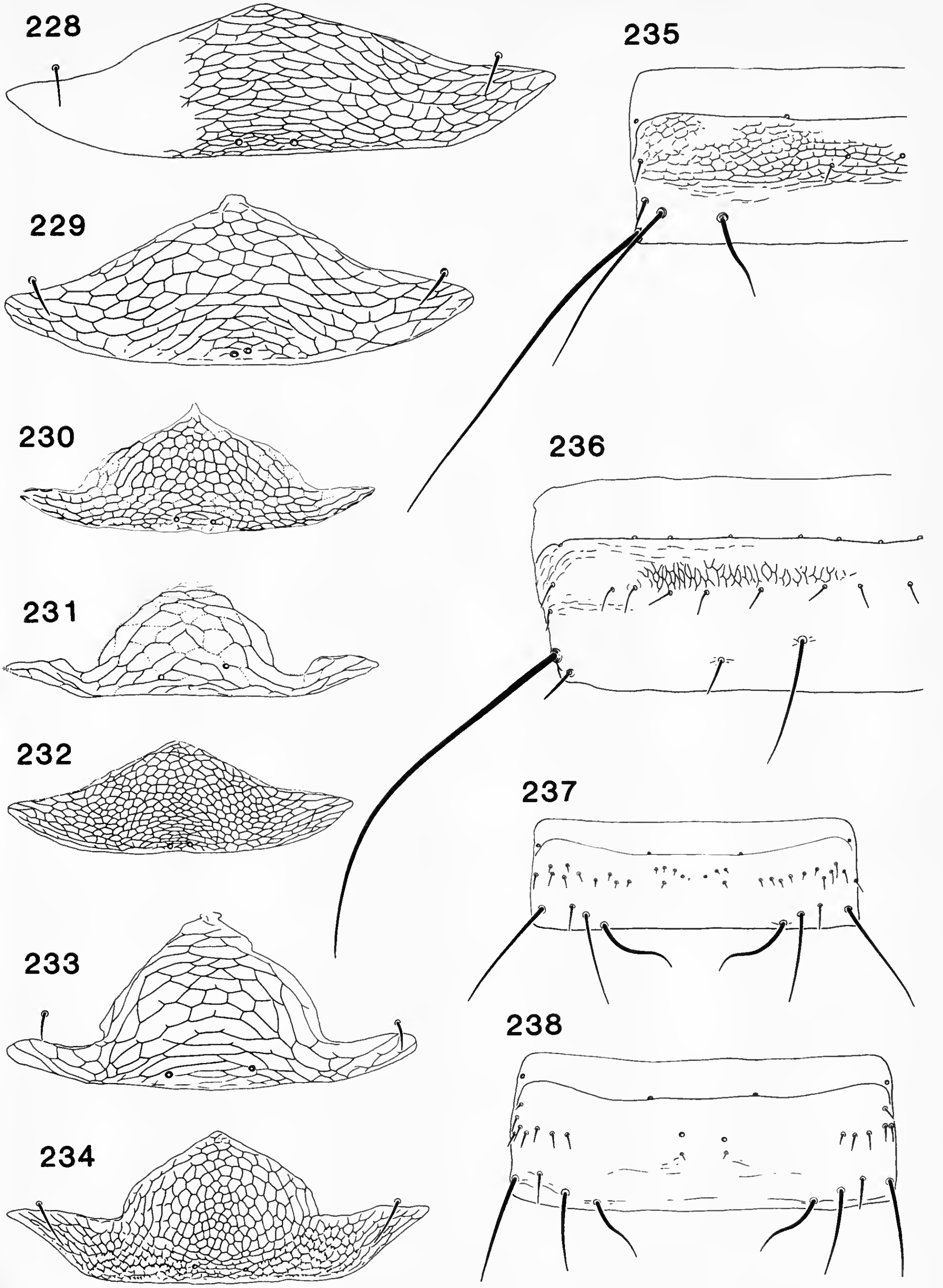
Figs 203–206 Macrothripina. 203, *Machatothrips biuncinatus*; 204, *M. antennatus*; 205, *Diaphorothrips clavipes*; 206, *Macrothrips papuensis* ♀.



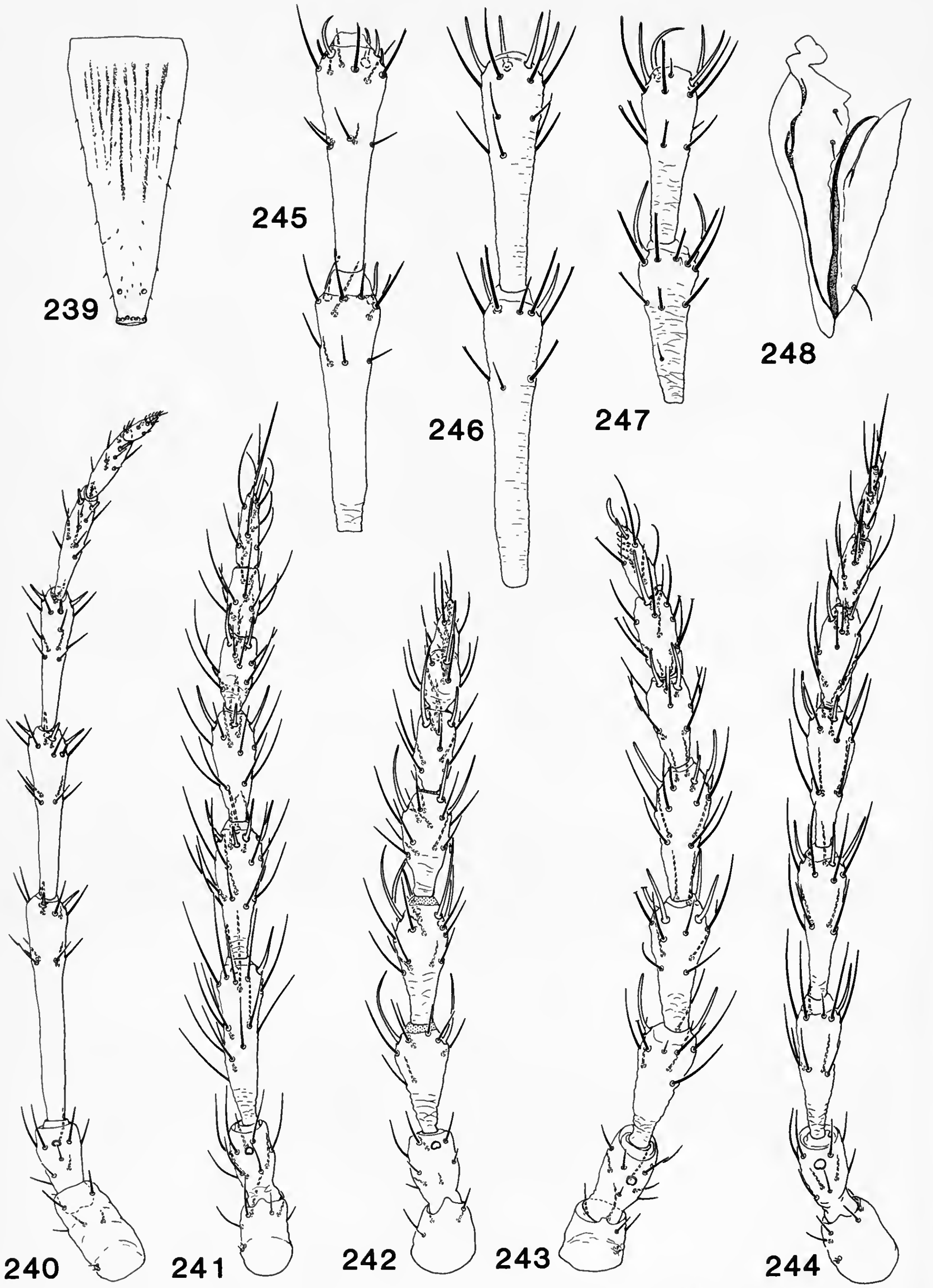
Figs 207–216 Macrothripina. 207, *Diaphorothrips hamipes*; 208, *D. clavipes* III–IV; 209–216, pelta of (209) *Macrothrips papuensis*; (210) *Machatothrips biuncinatus*; (211) *Polytrichothrips laticeps*; (212) *Peltariothrips insolitus*; (213) *Ischyrothrips crassus* ♀ holotype; (214) *Diaphorothrips clavipes*; (215) *Celidothrips* ? *adiaphorus*; (216) *Aesthesiothrips jatrophae*.



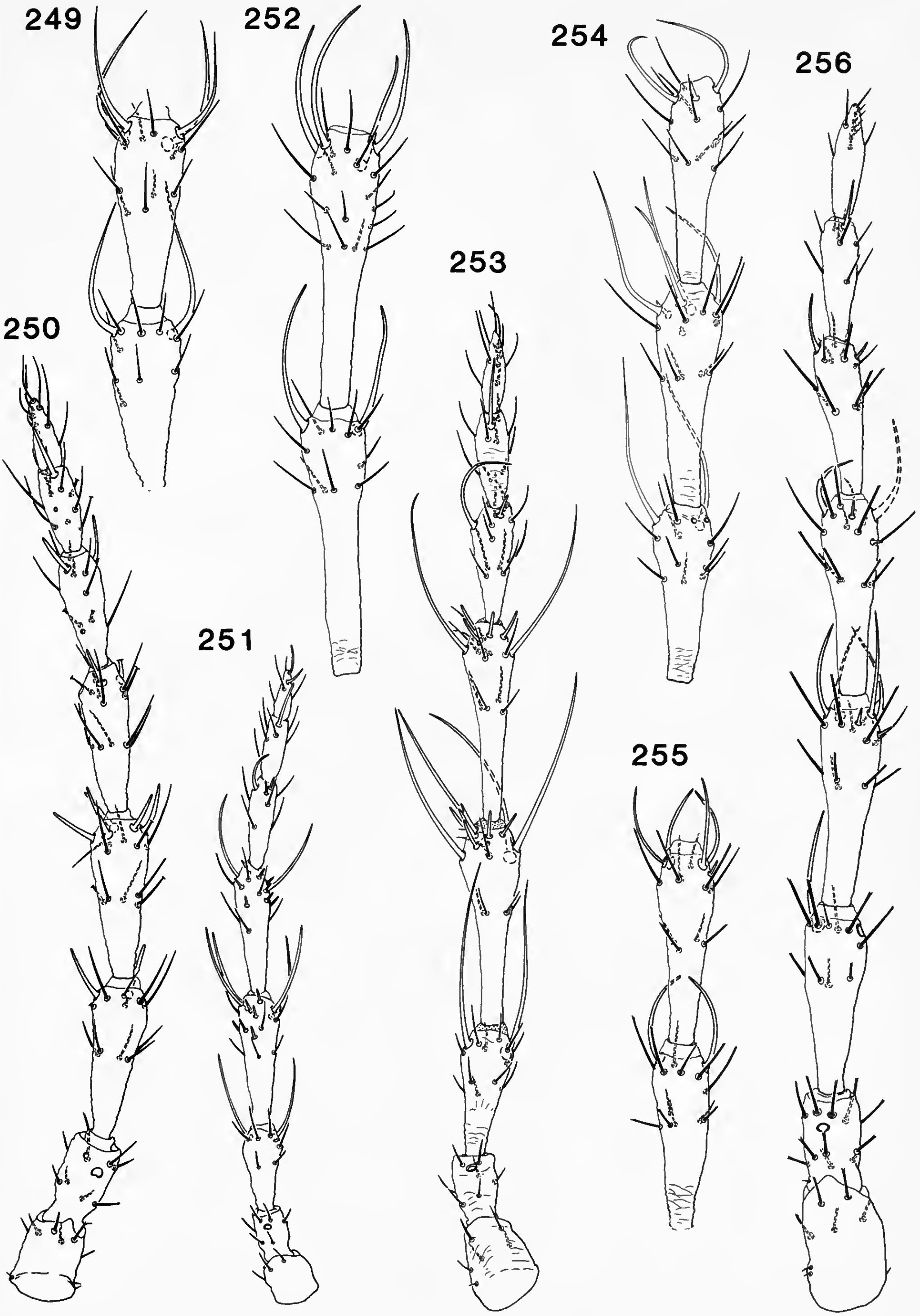
Figs 217–227 Macrothripina. 217, *Machatothrips haplodon* foreleg; 218, *M. antennatus* forefemur; 219, *M. heveae* forefemur; 220, *Diaphorothrips clavipes* foretarsus; 221, *Aesthesiothrips jatrophae* foretarsus; 222–227, Pelta of (222) *Diplacothrips borgmeieri*; (223) *Tarassothrips* sp. indet.; (224) *T. akritus*; (225) *Dichaetothrips secutor*; (226) *D. brevicollis* holotype; (227) *D. okajimai*.



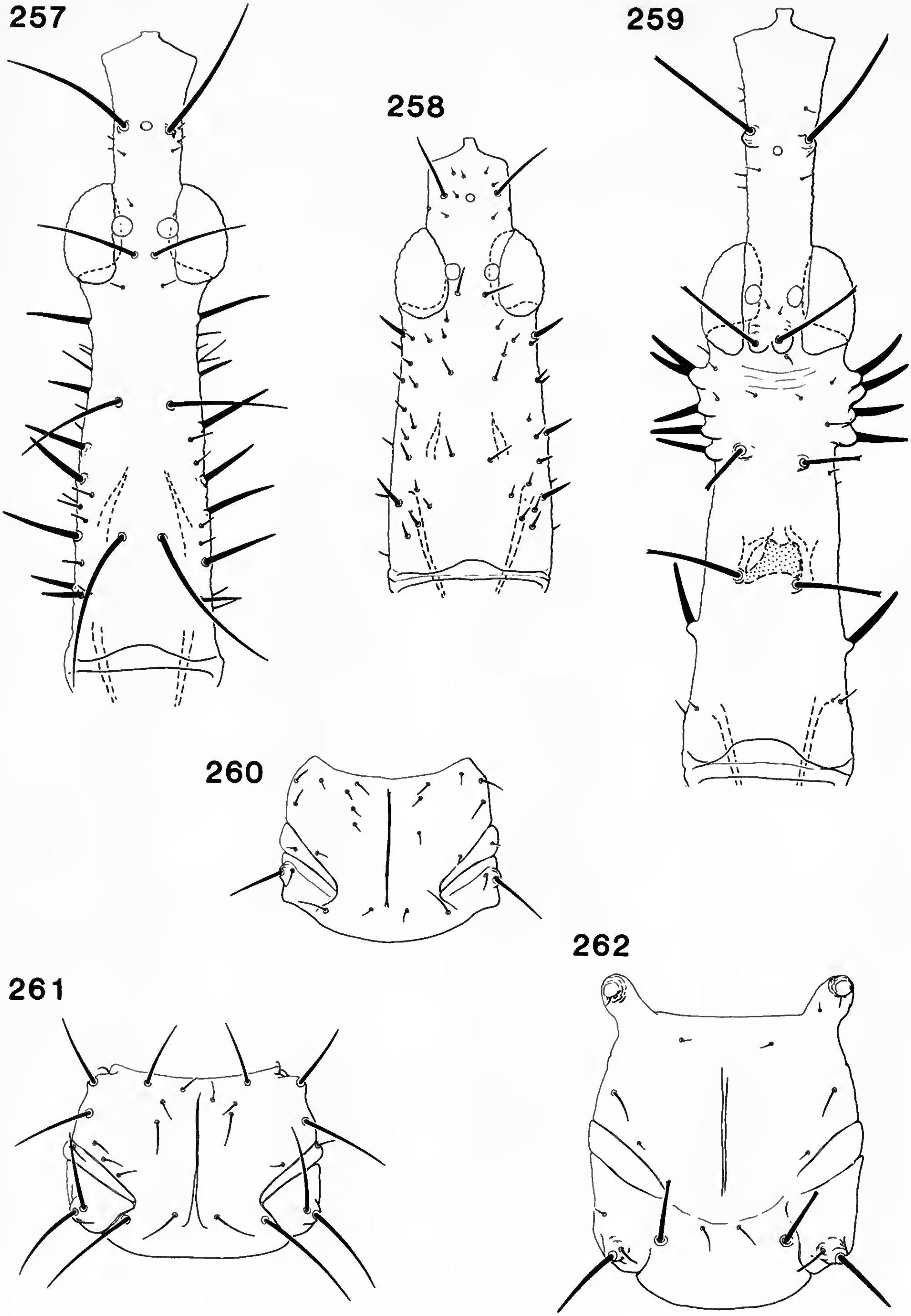
Figs 228–238 Macrothripiaa. 228–234, pelta of (228) *Ethirothrips agasthya*; (229) *E. firmus*; (230) *E. australiensis*; (231) *E. distasmus*; (232) *E. sybarita*; (233) *E. obscurus* (*neivai* holotype); (234) *E. stenomelas*; 235, *Dichaetothrips brevicollis* tergite V; 236, *D. okajimai* sternite V; 237, *Machatothrips lentus* tergite III; 238, *Aesthesiothrips jatrophae* tergite III.



Figs 239–248 Macrothripina. 239, *Diplacothrips borgmeieri* tube; 240, *Macrothrips papuensis*; 241, *Celidothrips lawrencei*; 242, *Peltariothrips insolitus* holotype; 243, *Polytrichothrips laticeps* (left); 244, *Ethirothrips anacardii*; 245, *Diplacothrips borgmeieri* III–IV; 246, *Machatothrips biuncinatus* III–IV; 247, *M. antennatus* III–IV; 248, *Dichaetothrips brevicollis* anapleural suture.



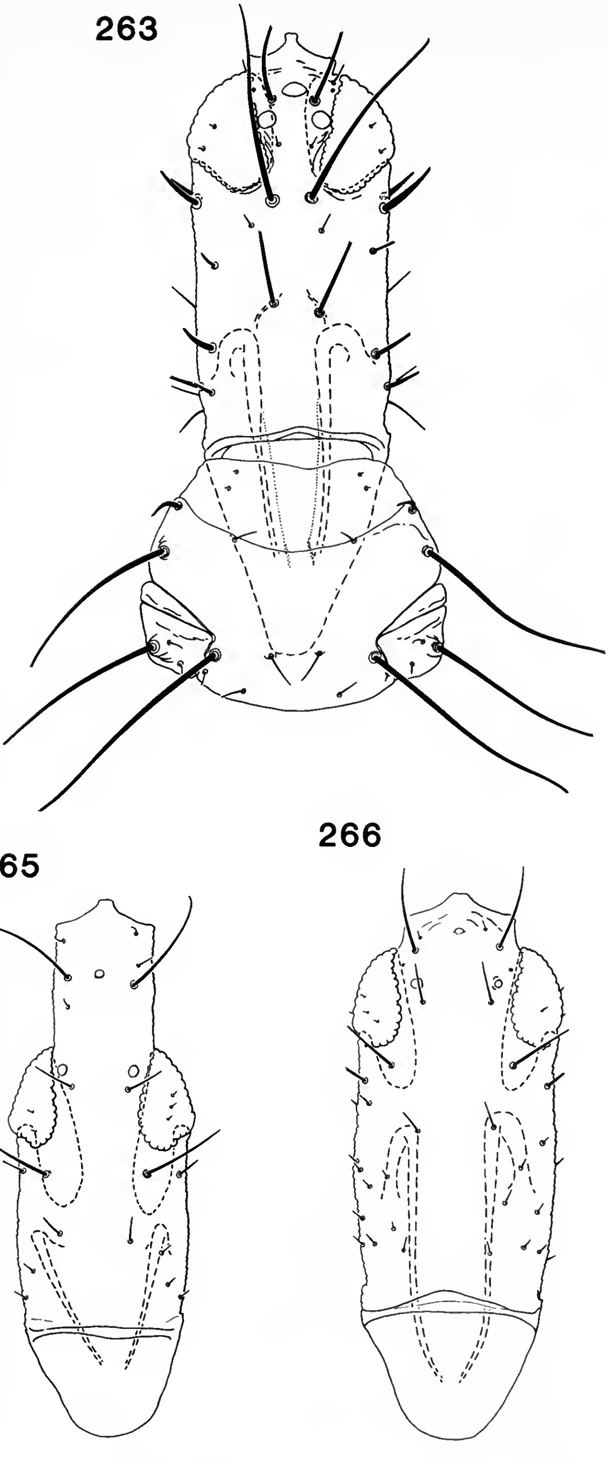
Figs 249–256 Macrothripina. 249, *Ethirothrips indicus* (Bagnall) III–IV; 250, *E. stenomelas* (left); 251, *Aesthesiothrips jatrophae*; 252, *Tarassothrips* sp. indet. III–IV; 253, *T. akritus*; 254, *Dichaetothrips brevicollis* holotype III–V; 255, *D. secutor* III–IV; 256, *D. okajimai*.



Figs 257–262 Elaphrothripina. 257, *Mecynothrips acanthus*; 258, *M. pugilator*; 259, *M. kraussi*; 260, *M. atratus* (*zuluensis* holotype) pronotum; 261, *M. hardyi*; 262, *M. kraussi*.

263

264

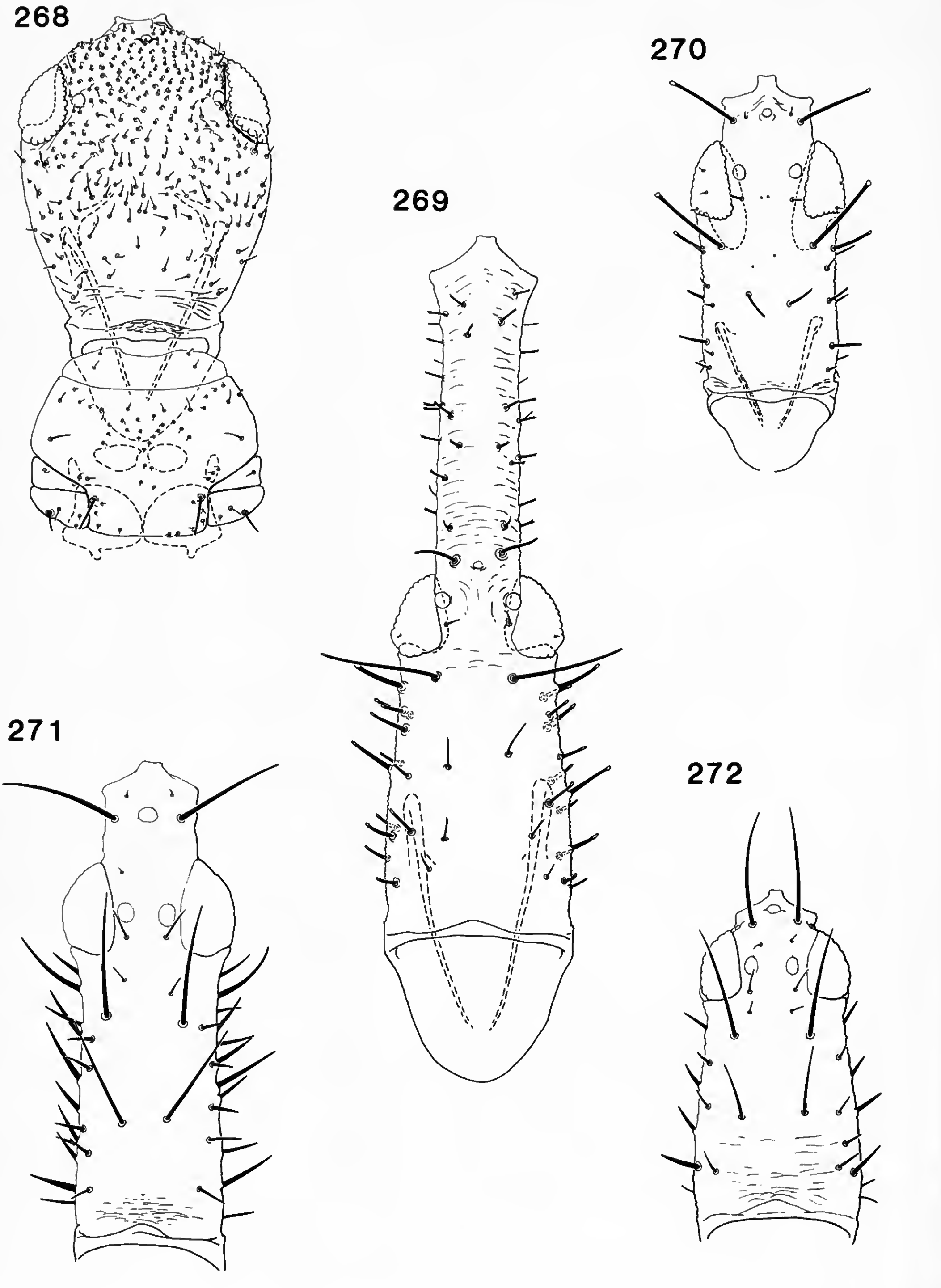


265

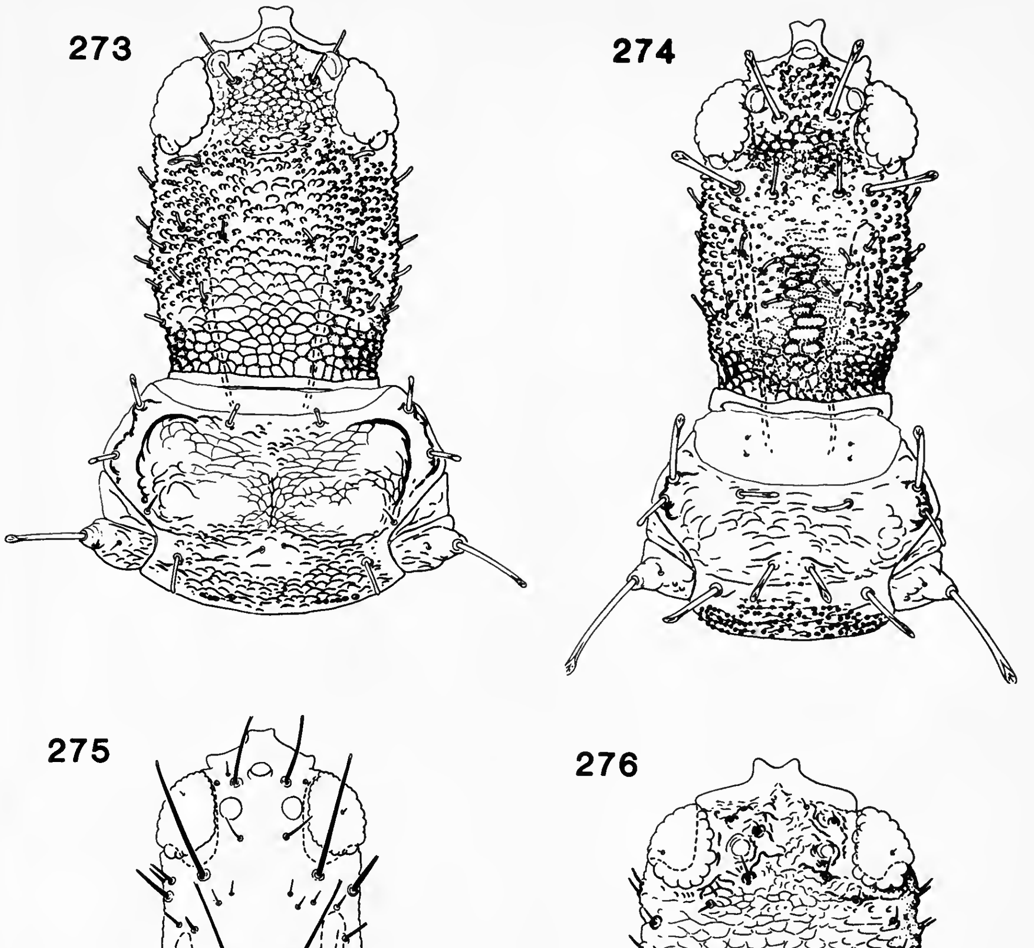
266

267

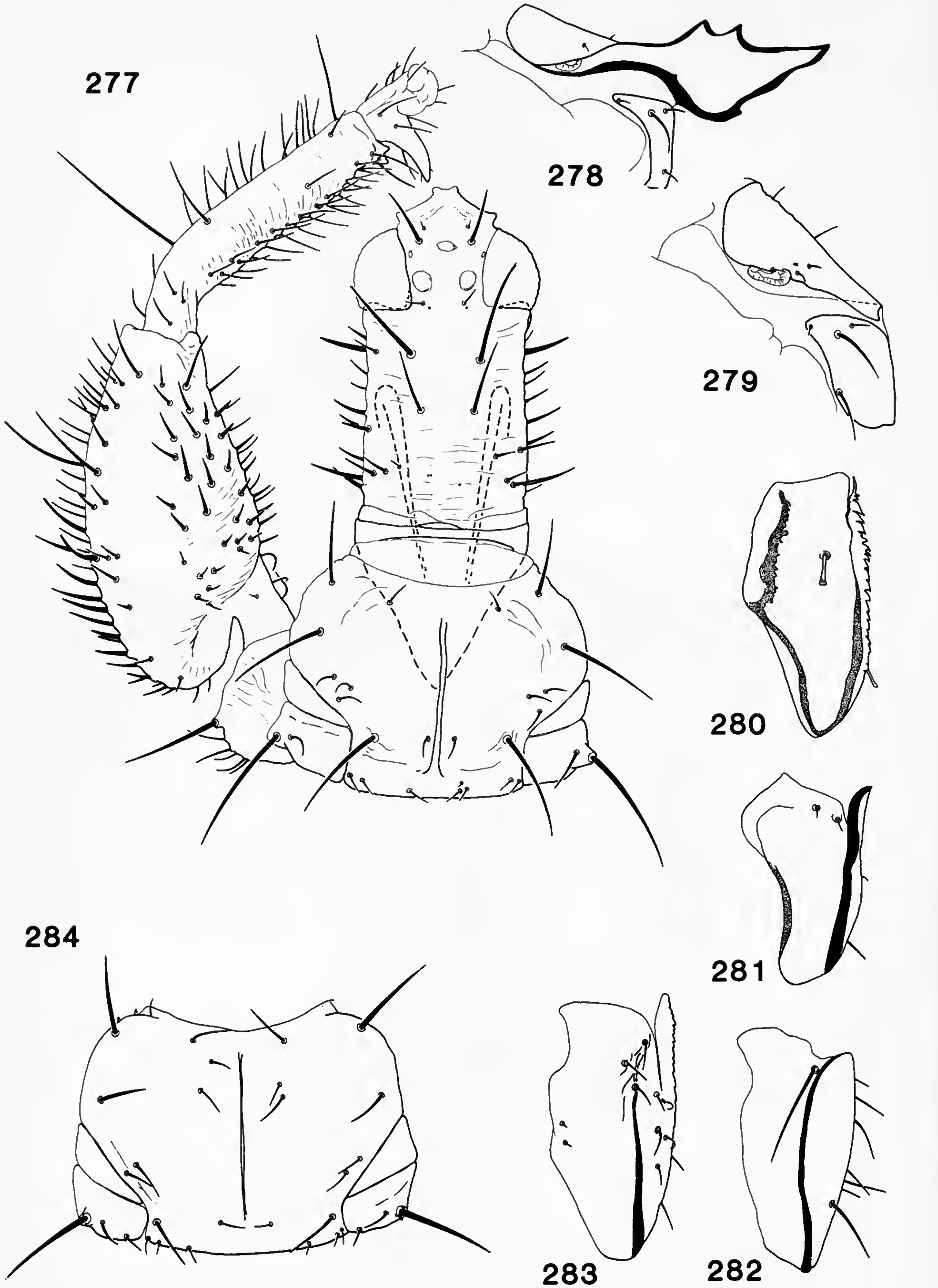
Figs 263–267 Elaphrothripina. 263, *Anactinothrips vigilans*; 264, *Ophthalmothrips* ? *priesneri* mac. from Kenya; 265, *O.* ? *priesneri* mic. from Tanzania; 266, *O. amyae* mac.; 267, *O. pomeroyi* mac. from Malawi.



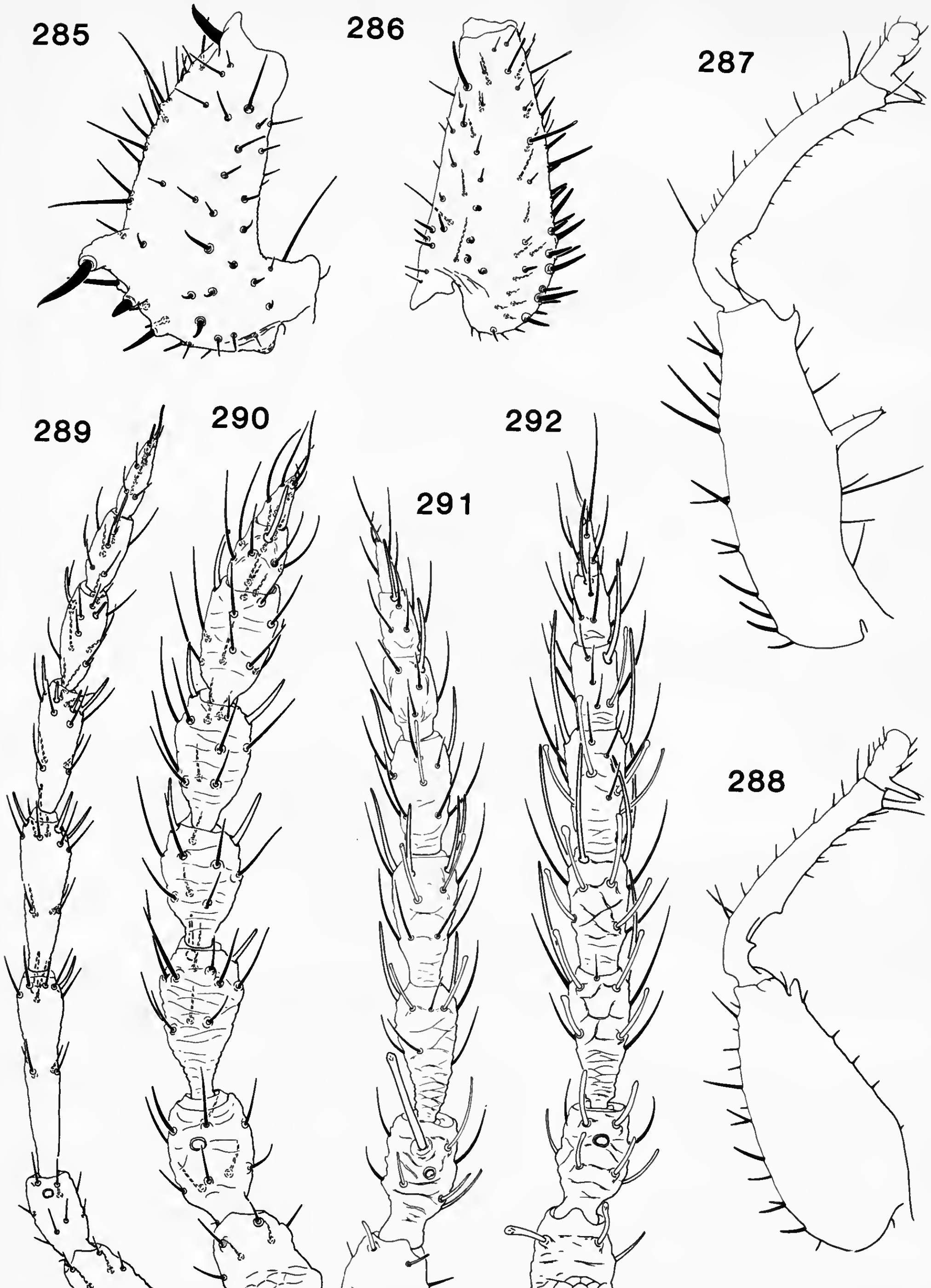
Figs 268–272 Elaphrothripina. 268, *Hartwigia tumiceps*; 269, *Tiarothrips subramanii*; 270, *Elaphrothrips palustris*; 271, *E. greeni* (*bouvieri* holotype); 272, *E. spiniceps*.



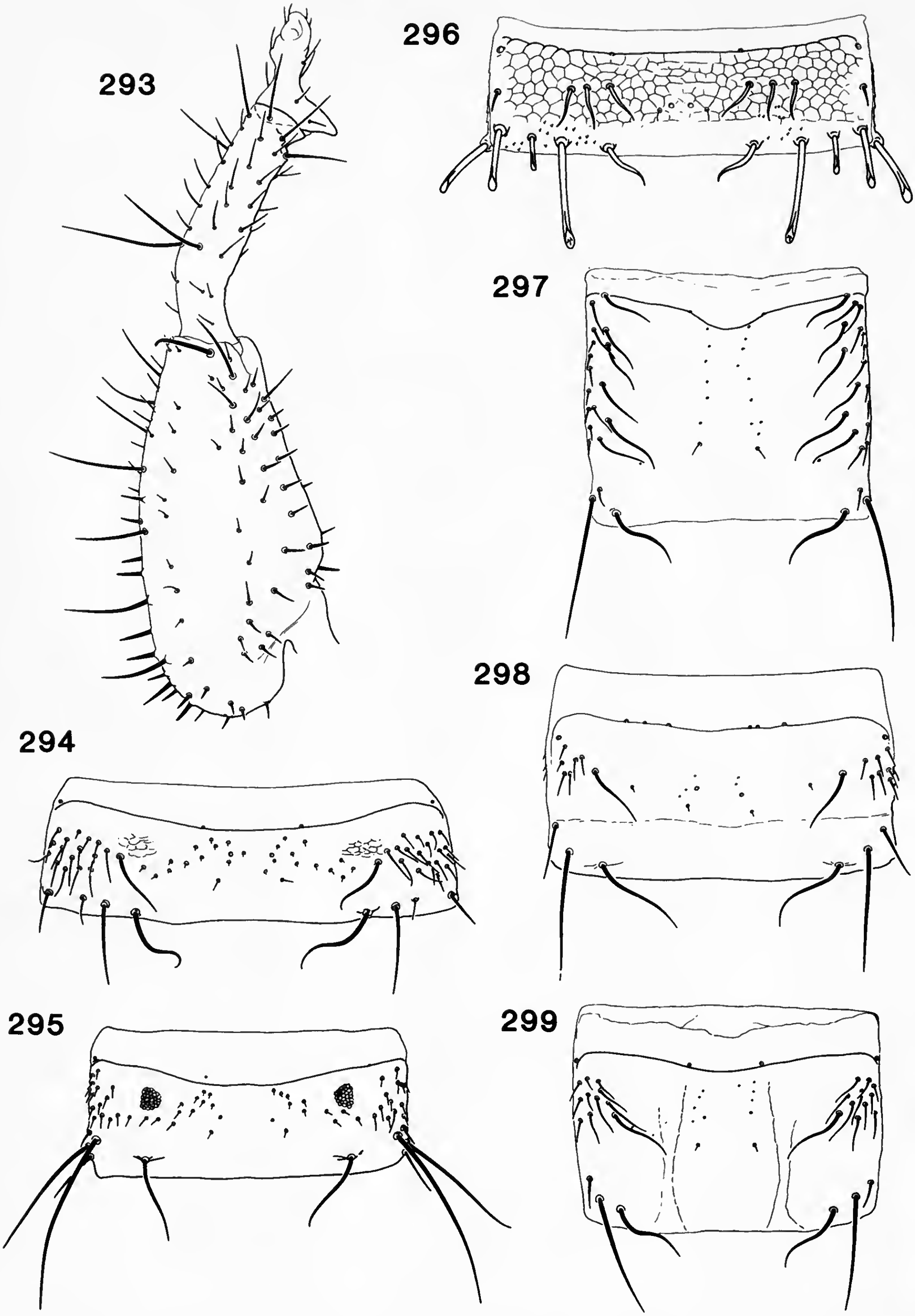
Figs 273–276 Elaphrothripina. 273, *Malesiathrips guamensis*; 274, *M. malayensis*; 275, *Lamillothrips typicus*; 276, *Dermothrips hawaiiensis*.



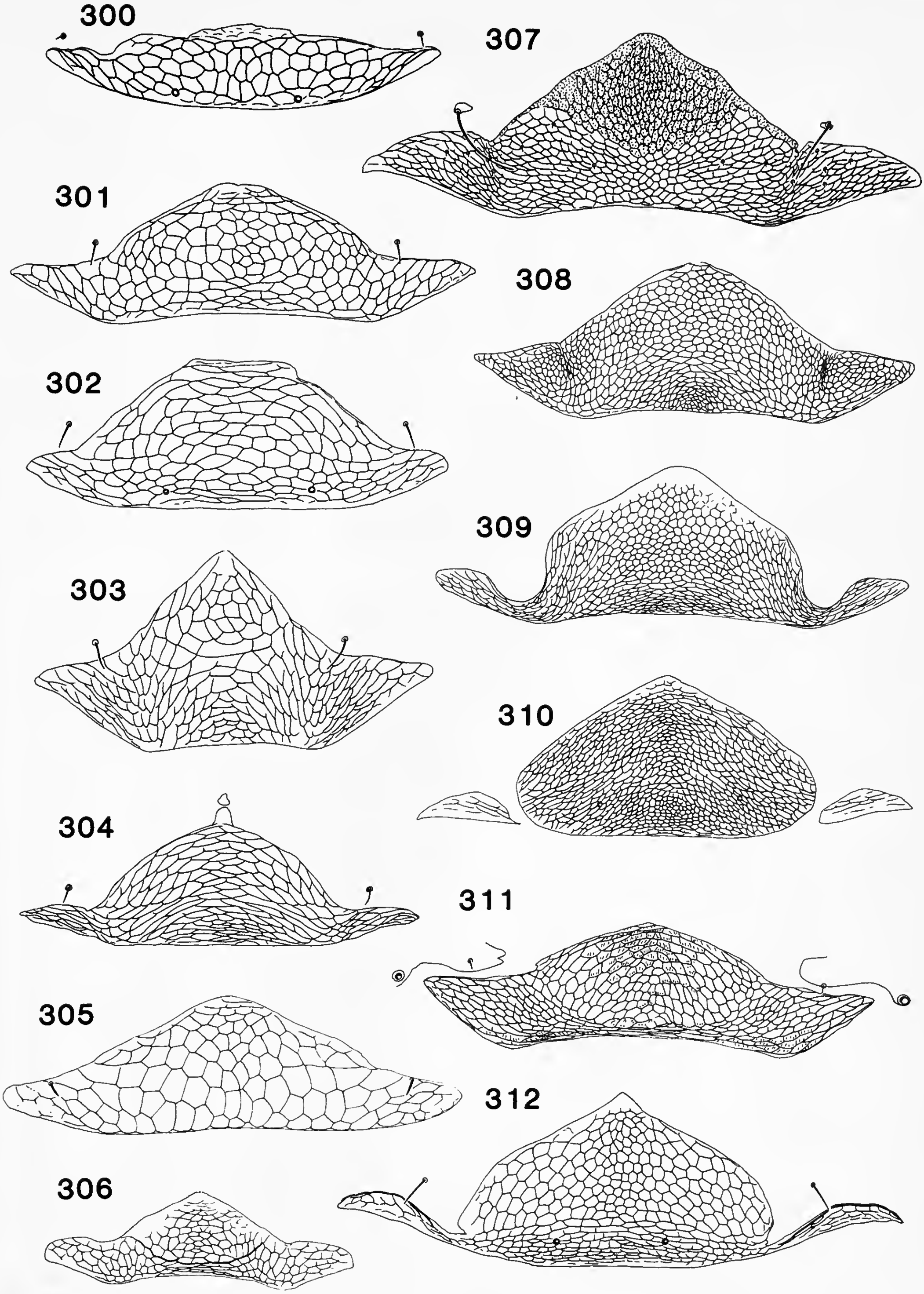
Figs 277–284 Elaphrothripina. 277, *Dinothrips spinosus* ♀; 278, *D. monodon* ♂ mesothoracic spiracular process; 279, *D. spinosus* small ♂ mesothoracic spiracle; 280–283, anapleural sutures of (280) *Malesiathrips malayensis*; (281) *Dermothrips hawaiiensis*; (282) *Elaphrothrips laevicollis*; (283) *Hartwigia tumiceps*; 284, *Elaphrothrips jacobsoni* ♂ pronotum.



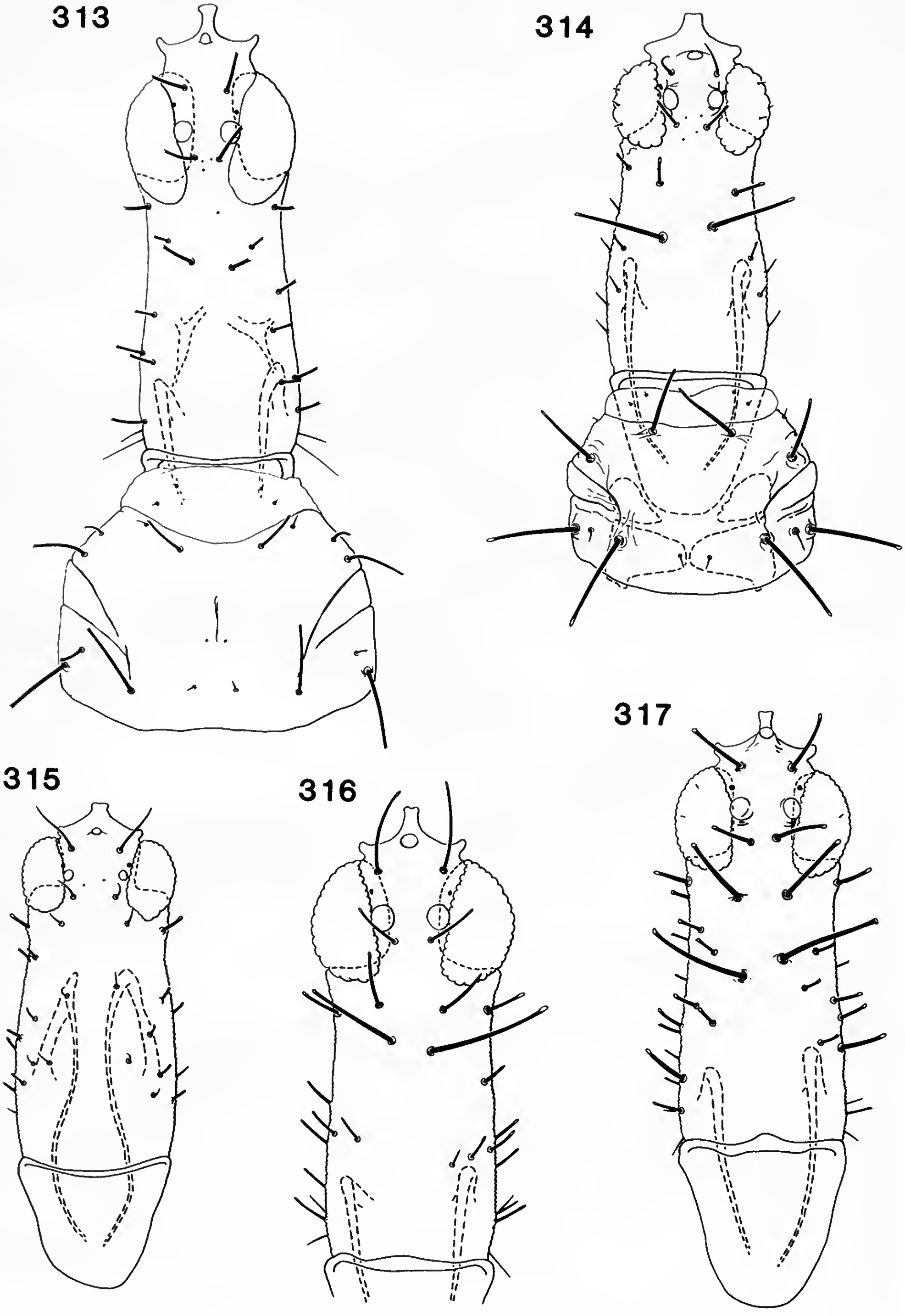
Figs 285–292 Elaphrothripina. 285, *Elaphrothrips femoralis* large ♂ forefemur; 286, *E. palustris* ♂ forefemur; 287, *Mecynothrips priesneri* ♂ foreleg; 288, *M. simplex* ♂ foreleg; 289, *Ophthalmothrips* ? *priesneri*; 290, *Dermothrips hawaiiensis*; 291, *Malesiathrips guamensis*; 292, *M. malayensis*.



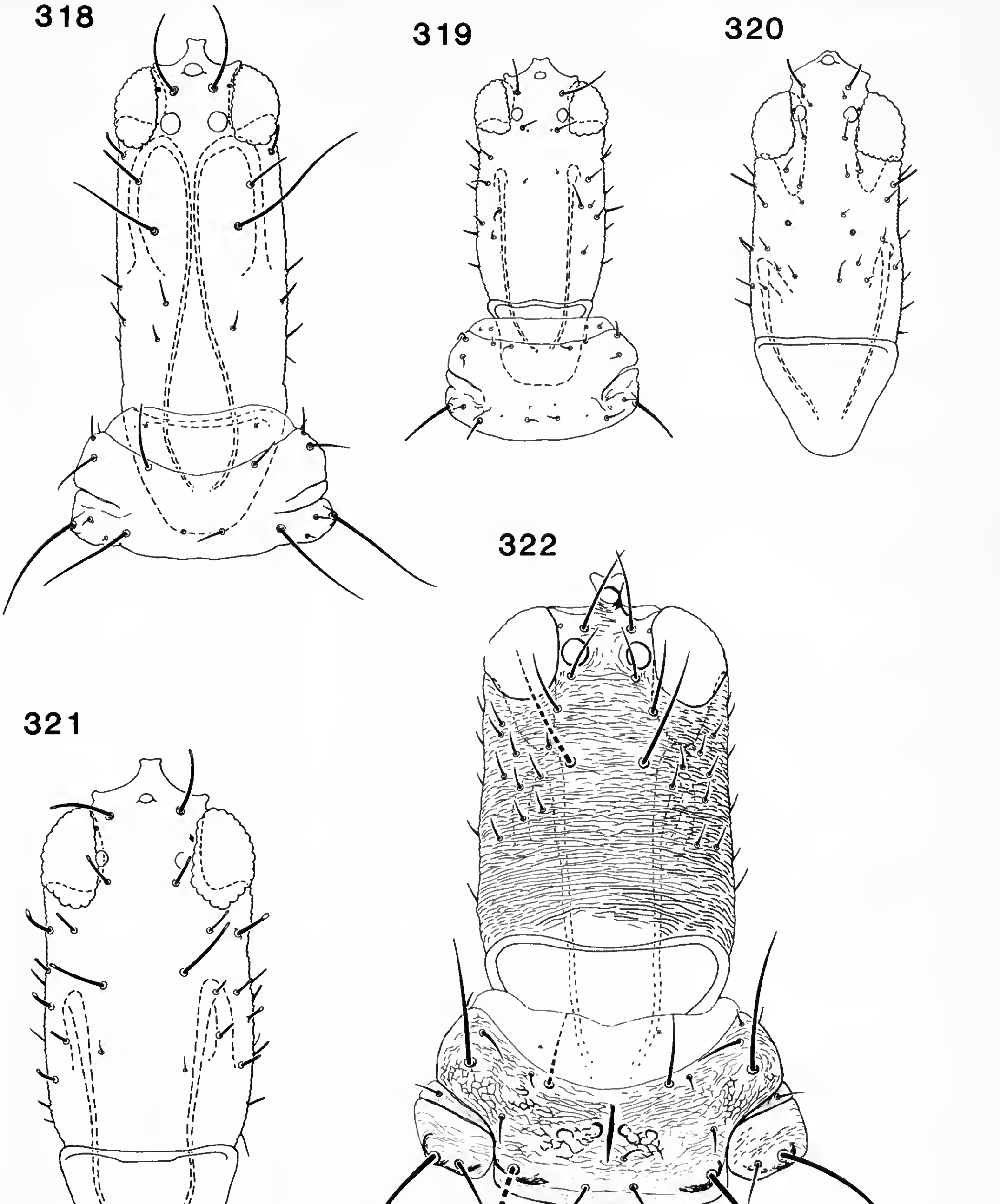
Figs 293–299 Elaphrothripina. 293, *Elaphrothrips denticollis* (*productus* holotype) ♂ foreleg; 294, *Hartwigia tumiceps* mac. tergite III; 295, *Anactinothrips vigilans* tergite III; 296, *Malesiathrips malayensis* mac. tergite IV; 297, *Mecynothrips simplex* tergite III; 298, *Dinothrips sumatrensis* tergite III; 299, *Elaphrothrips bakeri* ♂ tergite III.



Figs 300–312 Pelta of Elaphrothripina species. 300, *Dermothrips hawaiiensis*; 301, *Tiarothrips subramanii*; 302, *Ophthalmothrips amyae*; 303, *O. longiceps*; 304, *Hartwigia tumiceps*; 305, *Malesiathrips malayensis*; 306, *Mecynothrips atratus*; 307, *Elaphrothrips laevicollis*; 308, *E. denticollis*; 309, *E. spiniceps*; 310, *Dinothrips sumatrensis*; 311, *Anactinothrips vigilans*; 312, *Lamillothrips typicus*.

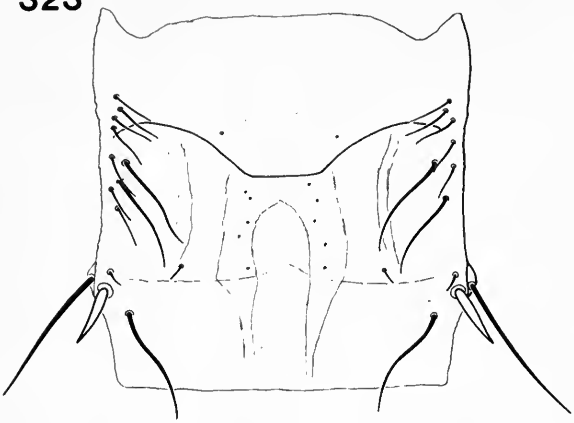


Figs 313–317 Idolothripina. 313, *Meiothrips annulipes*; 314, *Bactrothrips pitkini* ♀ paratype; 315, *Bacillothrips nobilis*; 316, *Bactrothrips idolomorphus* ♂ from Java; 317, *Idolothrips spectrum* ♀.

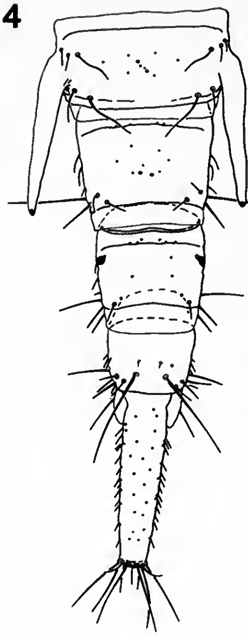


Figs 318–322 Idolothripina. 318, *Megalothrips andrei* ♂ holotype; 319, *Ceuthothrips timuqua*; 320, *Cylindrothrips niger* holotype; 321, *Megathrips lativentris*; 322, *Lasiothrips perplexus* holotype.

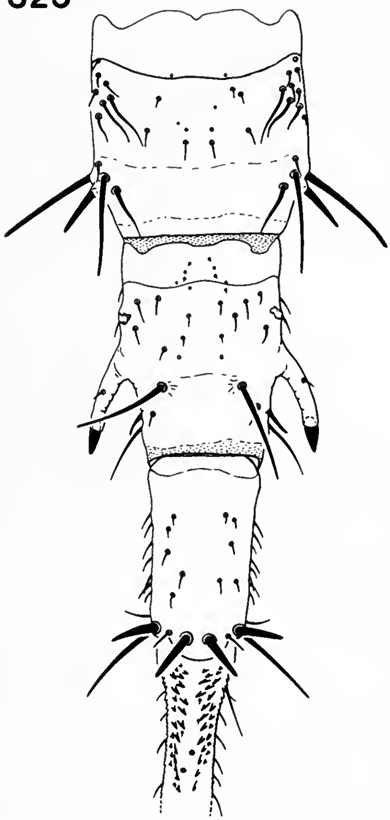
323



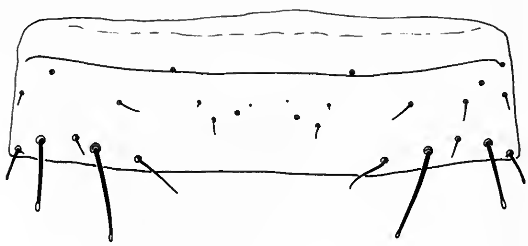
324



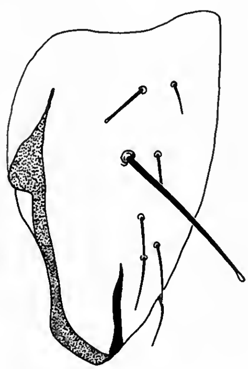
325



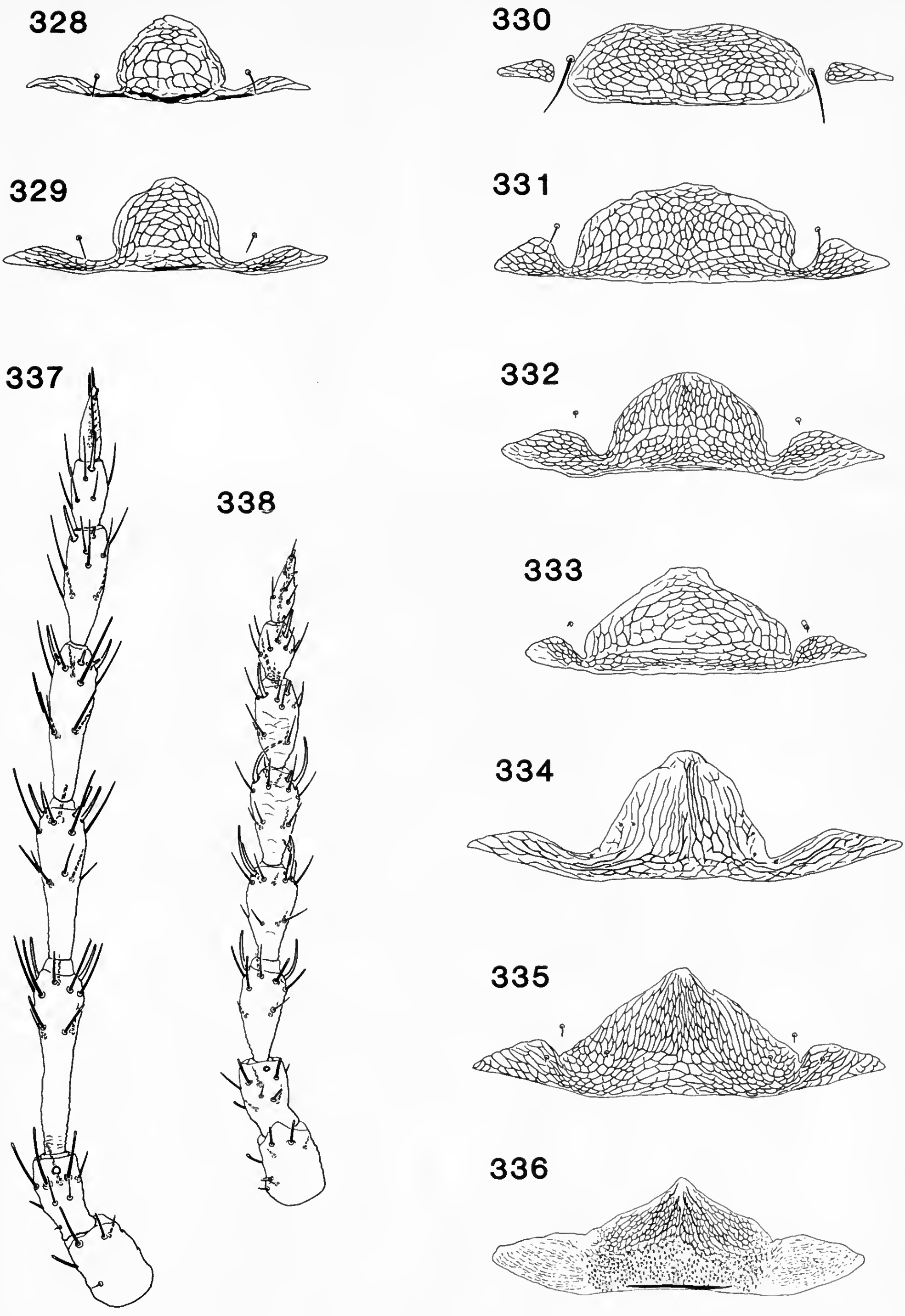
326



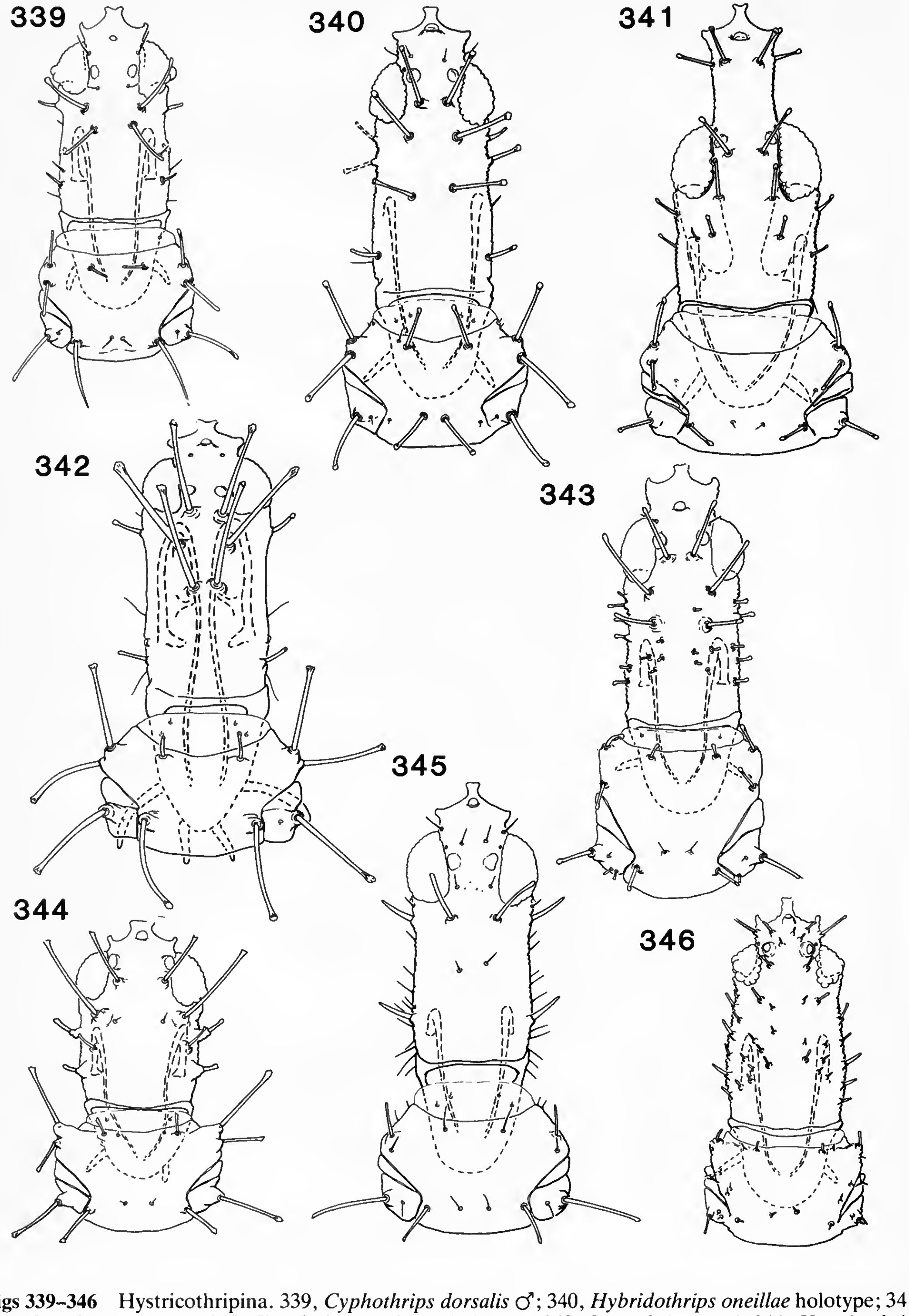
327



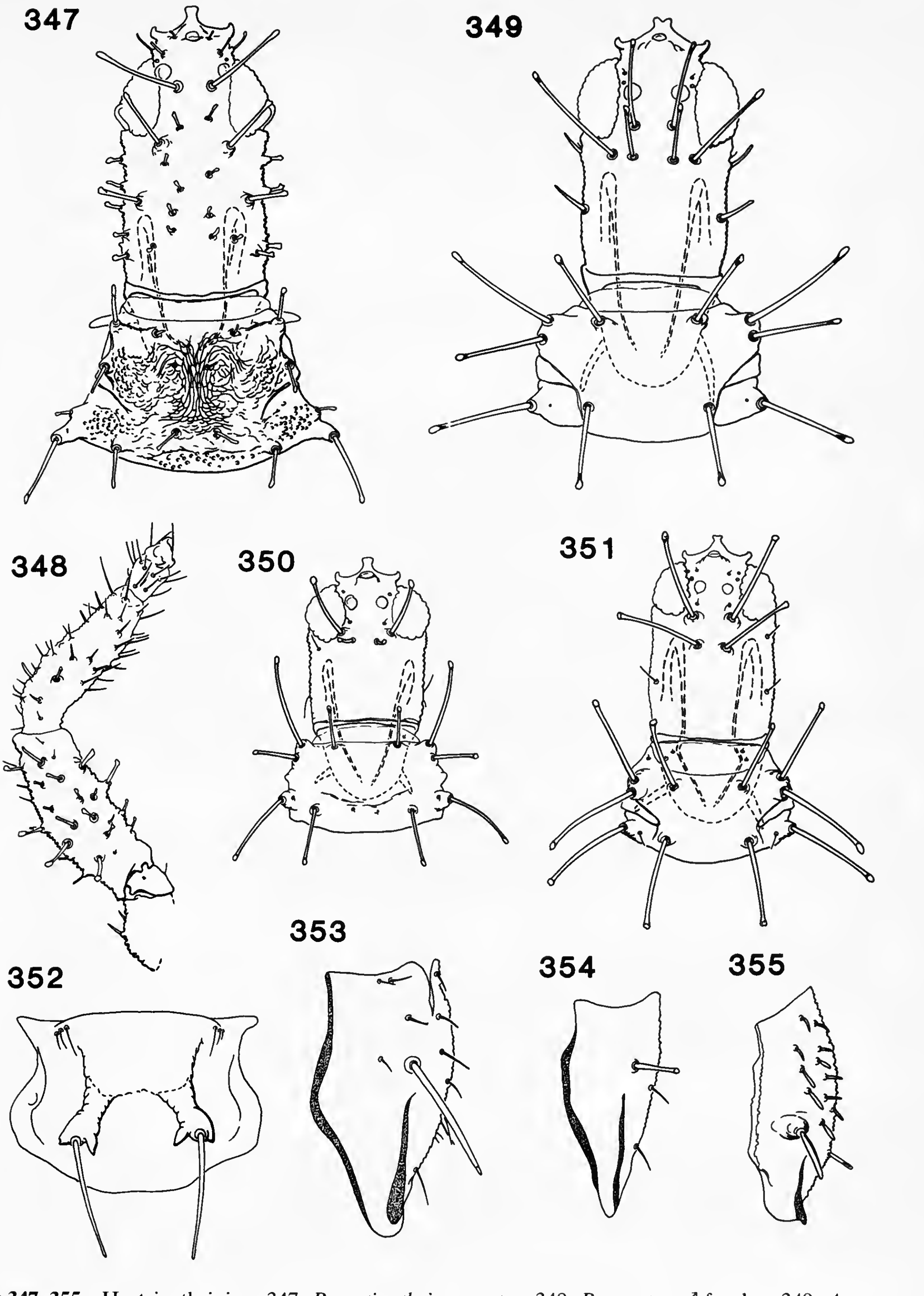
Figs 323–327 Idolothripina. 323, *Meiothrips annulipes* ♂ tergite V; 324, *Megalothrips andrei* ♂ holotype; 325, *Idolothrips dissimilis* ♂; 326, *Megathrips lativentris* ♀ mac. tergite IV; 327, *Meiothrips annulipes* anapleural suture.



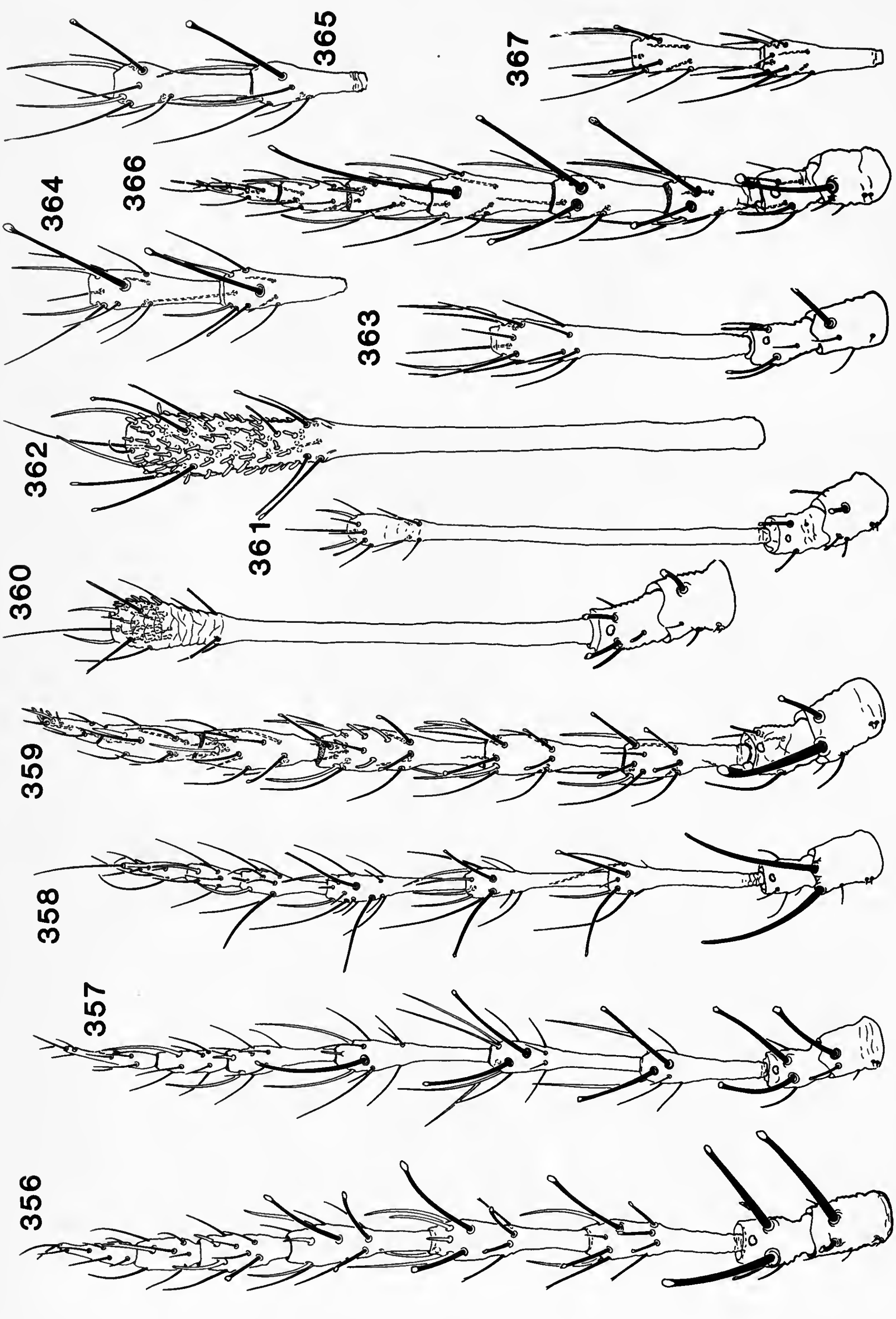
Figs 328–338 Idolothripina. 328–336, pelta of (328) *Ceuthothrips timuqua*; (329) *Megalothrips andrei*; (330) *Bacillothrips longiceps*; (331) *Megathrips lativentris*; (332) *Bactrothrips idolomorphus*; (333) *E. pitkini* ♀ mac.; (334) *Idolothrips nativus*; (335) *Cylindrothrips niger* (*turneri* holotype); (336) *Meiothrips annulipes*; 337, *Megalothrips andrei*; 338, *Ceuthothrips timuqua*.



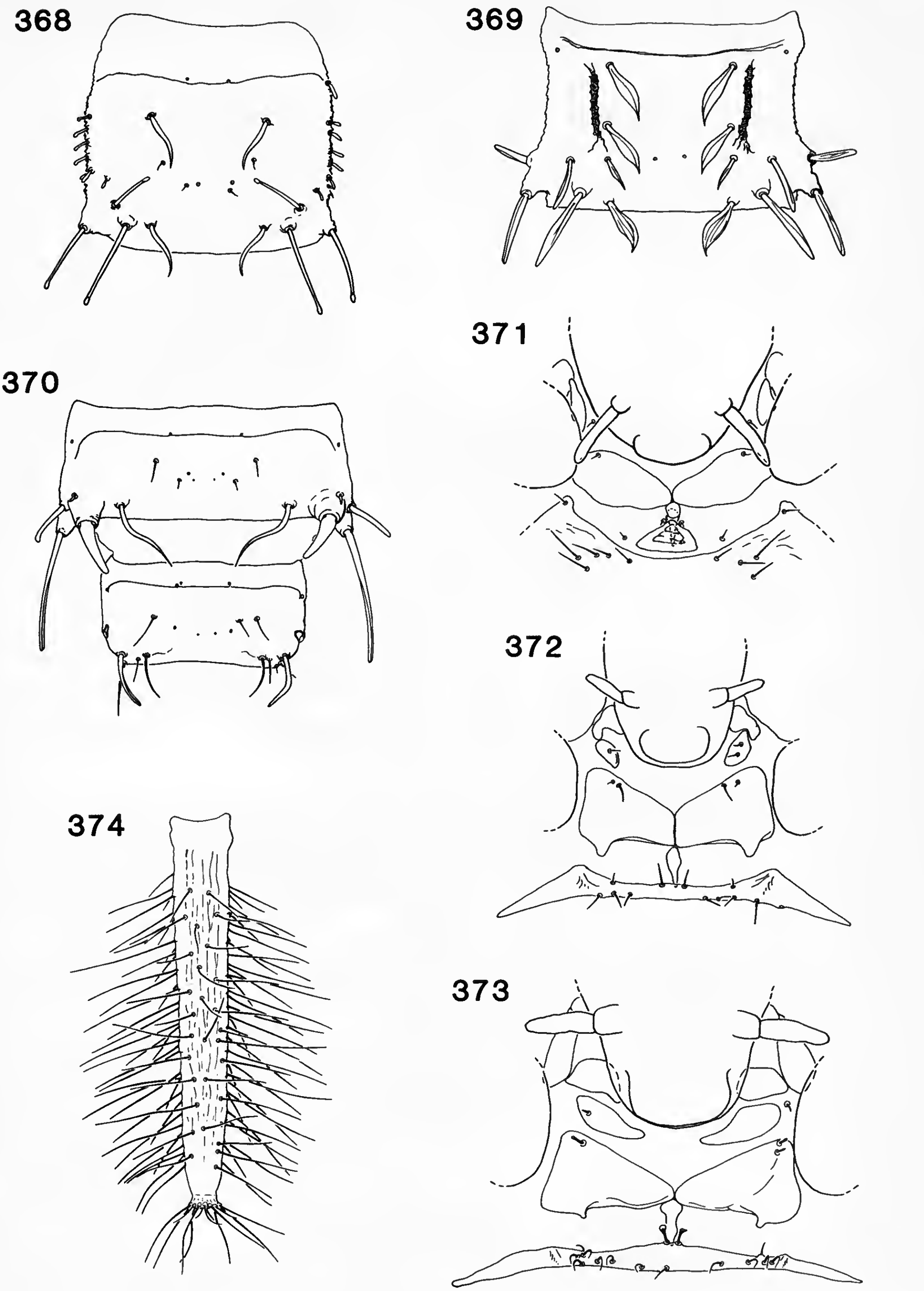
Figs 339–346 Hystricothripina. 339, *Cyphothrips dorsalis* ♂; 340, *Hybridothrips oneillae* holotype; 341, *Holurothrips ornatus*; 342, *Zeuglothrips echinus* holotype; 343, *Saurothrips assai*; 344, *Hystricothrips phasgonura* ♂; 345, *Actinothrips fraterculus* ♀; 346, *Atractothrips bradleyi*.



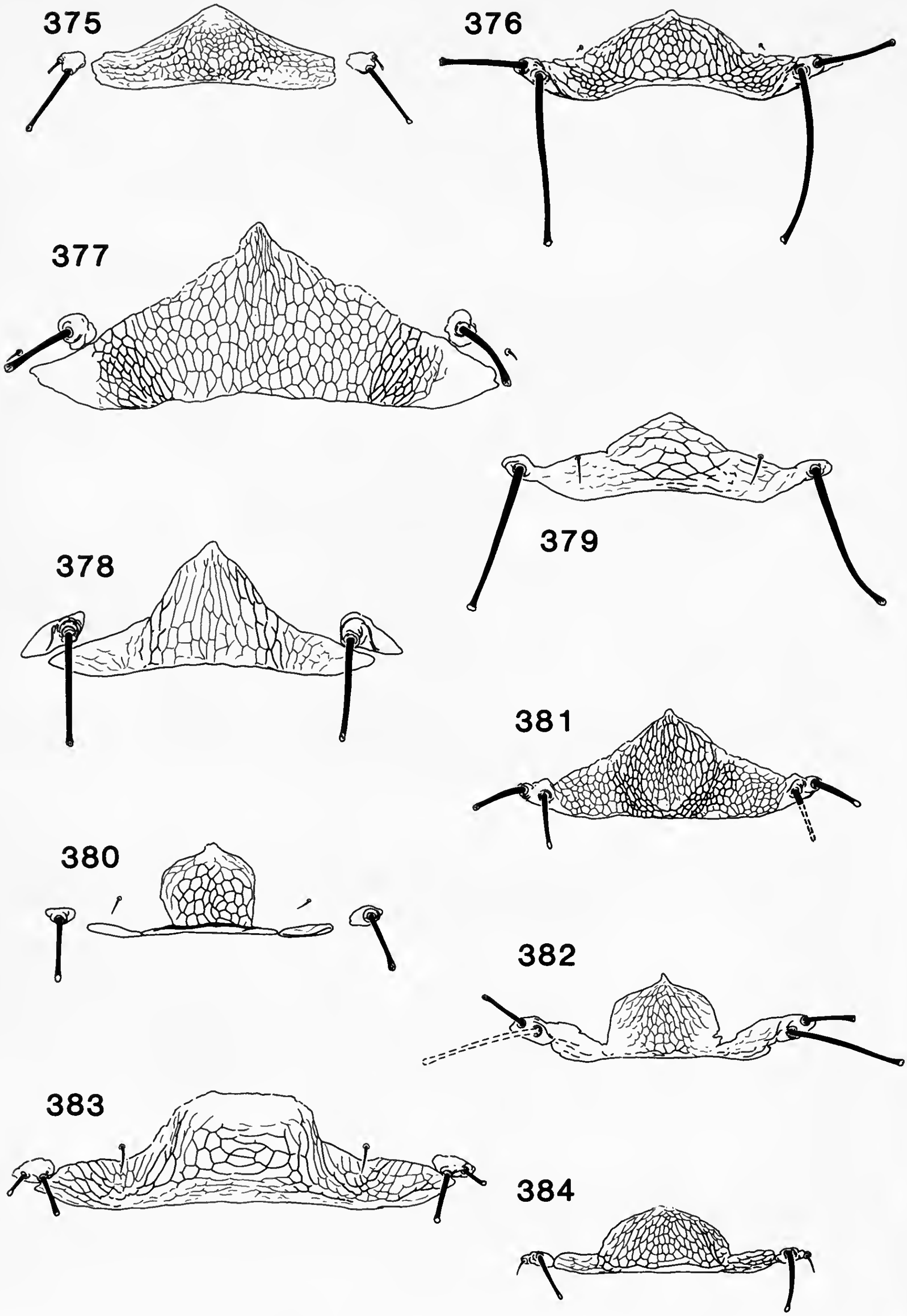
Figs 347–355 Hystricothripina. 347, *Paractinothrips peratus*; 348, *P. peratus* ♂ foreleg; 349, *Azeugmatothrips rectus*; 350, *Zeugmatothrips cinctus*; 351, *Z. priesneri*; 352, *Cyphothrips dorsalis* ♂ metanotum; 353, *Actinothrips femoralis* anapleural suture; 354, *Holurothrips ornatus* anapleural suture; 355, *Paractinothrips peratus* anapleural suture.



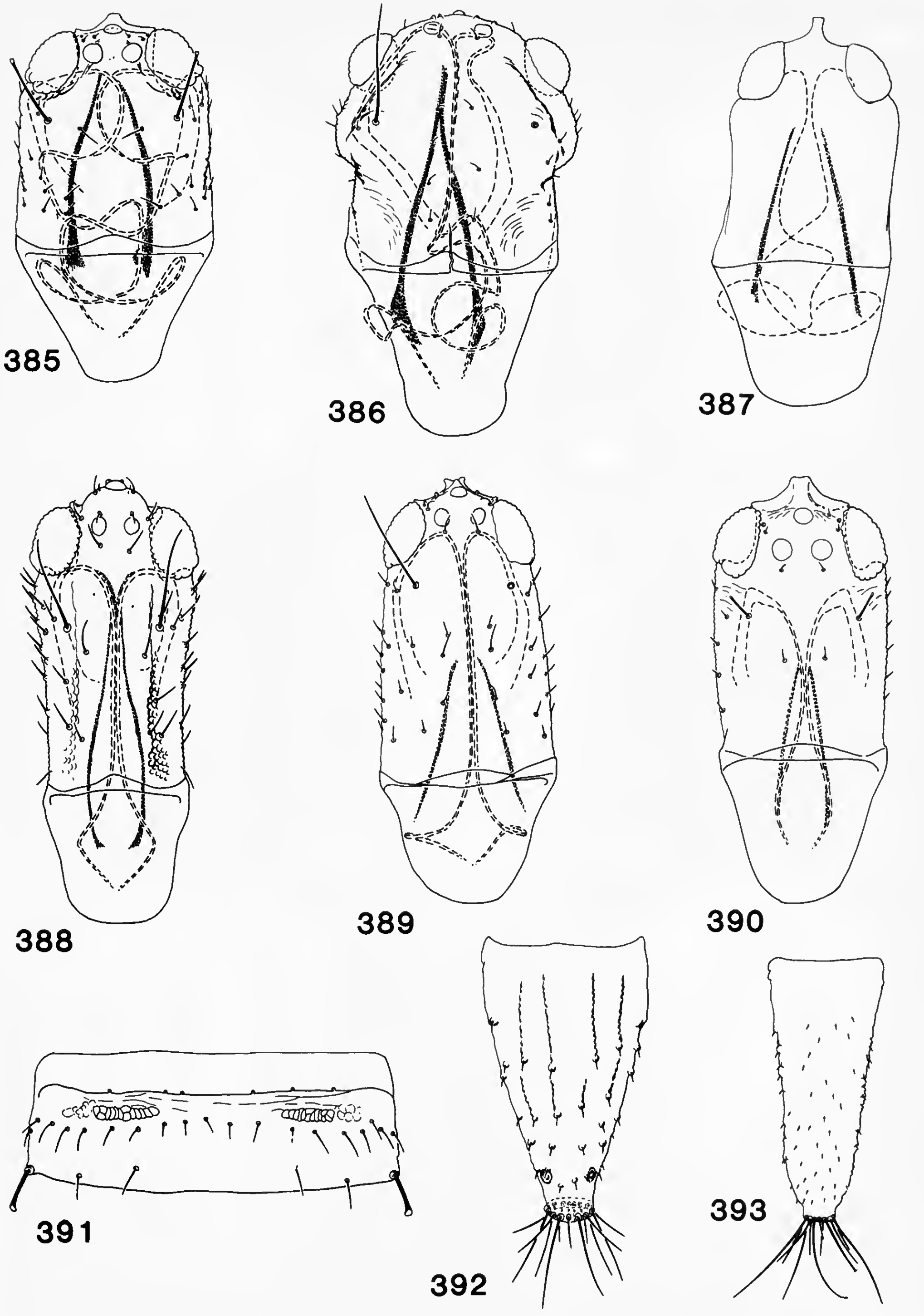
Figs 356–367 Hystricothripina. 356, *Saurothrips assai*; 357, *Azeugmatothrips rectus*; 358, *Hystricothrips phasgonura*; 359, *Paractinothrips peratus*; 360, *Hybridothrips oneillae* I–III; 361, *Holurothrips ornatus* I–III; 362, *Zactinothrips elegans* III; 363, *Cyphothrips dorsalis* I–III; 364, *Zeugmatothrips priesneri* III–IV; 365, *Z. hispidus* III–IV; 366, *Z. cinctus*; 367, *Z. hoodi* III–IV.



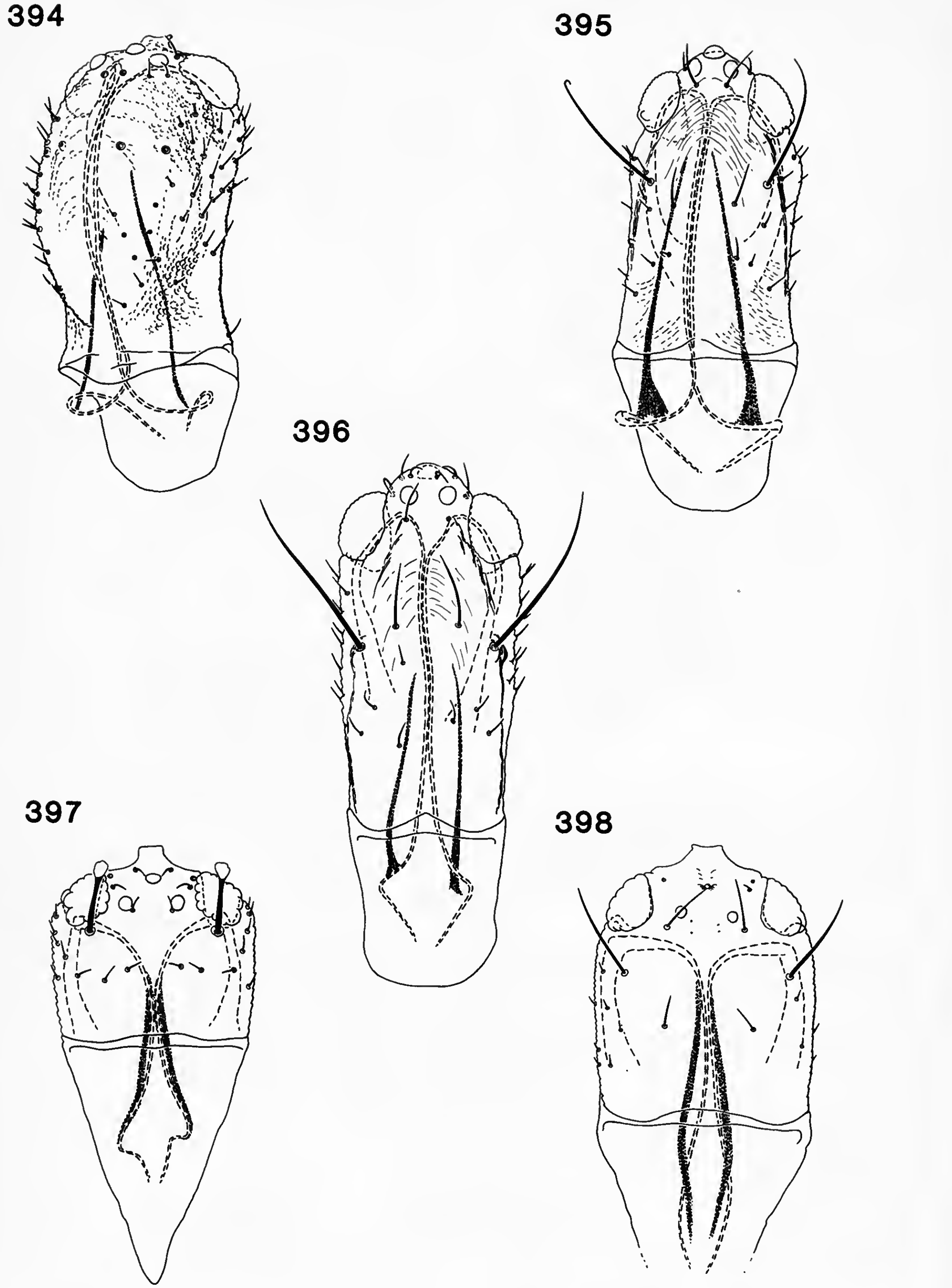
Figs 368–374 Hystricothripina. 368, *Saurothrips assai* tergite III; 369, *Paractinothrips peratus* tergite III; 370, *Hystricothrips phasgonura* ♂ VII–VIII; 371–373, mouth cone and prosternal plates of (371) *Zeugmatothrips priesneri*; (372) *Neatractothrips macrurus*; (373) *Paractinothrips peratus*; 374, *Azeugmatothrips rectus* tube.



Figs 375–384 Pelta of Hystricothripina species. 375, *Hystricothrips phasgonura*; 376, *Zeuglothrips echinus*; 377, *Neatractothrips macrurus*; 378, *Paractinothrips peratus*; 379, *Zeugmatothrips priesneri*; 380, *Z. hispidus*; 381, *Saurothrips assai*; 382, *Azeugmatothrips rectus*; 383, *Holurothrips ornatus*; 384, *Cyphothrips dorsalis*.

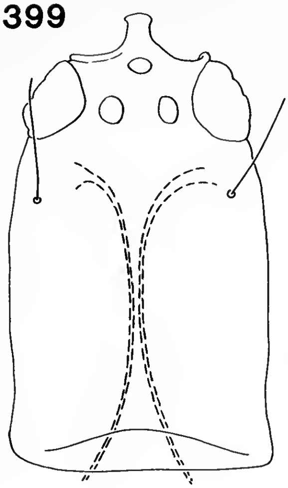


Figs 385–393 Docessissophothripini. 385, *Maxillata* sp. indet from Jamaica; 386, ? *Maxillata* from Ghana; 387, *Tropothrips dampfi* holotype (setae omitted); 388, *Holothrips peruvianus* ♀ paratype; 389, *H. zimmermanni* holotype; 390, *H. procerus* ♀ paratype; 391, *Asemothrips picturatus* ♂ sternite IV; 392, *Symphyothrips* nr. *punctatus* tube; 393, *Holothrips* (? *Lathrobiothrips*) sp. indet. tube.

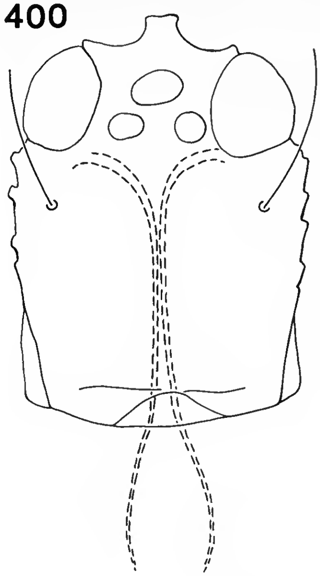


Figs 394–398 Docessissophothripini. 394, *Docessissophothrips ampliceps* ♂ holotype; 395, *D. major* ♀ holotype; 396, *Oidanothrips frontalis* ♀ holotype; 397, *Symphyothrips* near *punctatus* from Panama; 398, *Abiastothrips soror*.

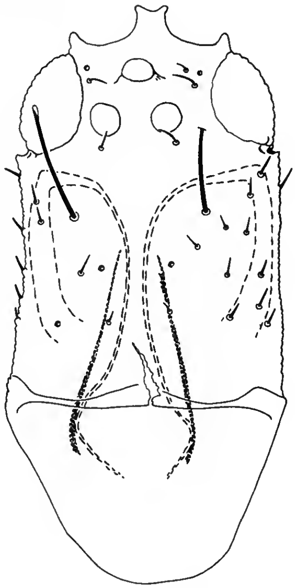
399



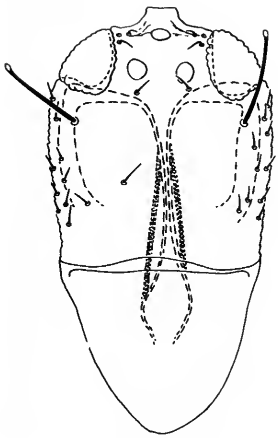
400



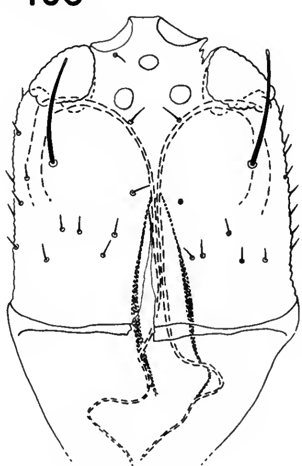
401



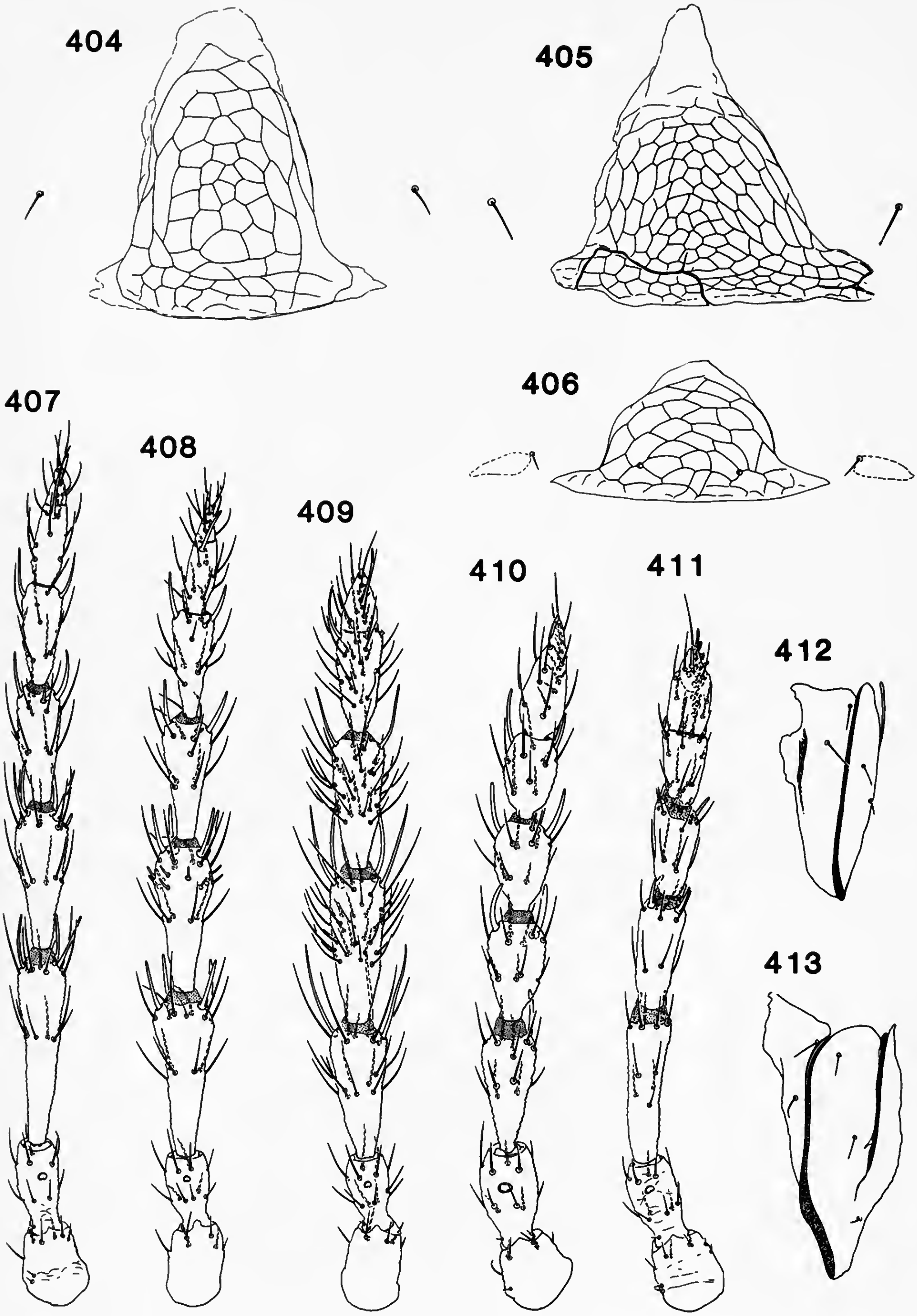
402



403



Figs 399–403 Docessissophothripini. 399, 400, outline sketches of (399) *Holothrips typicus* (Ananthakrishnan) holotype; (400) *H. semiflavus* holotype; 401, *H. typicus* (Bagnall) holotype; 402, *H. ambitus*; 403, *H. ingens* ♀ holotype.



Figs 404–413 Docessissophothripini. 404, *Holothrips ingens* pelta; 405, *Docessissophothrips ampliceps* pelta; 406, *Symphyothrips* near *punctatus* pelta; 407, *Holothrips ingens*; 408, *Oidanothrips frontalis*; 409, *Holothrips peruvianus*; 410, *Symphyothrips* near *punctatus*; 411, *Asemothrips finlayi*; 412, *Holothrips ingens* anapleural suture; 413, *Docessissophothrips ampliceps* anapleural suture.

Index

Synonyms are in *italics*; original generic combinations are indicated for identical specific epithets.

British Museum (Natural History)

Chance, change & challenge

Two multi-author volumes from one of the foremost scientific institutions in the world.

General Editor: P. H. Greenwood

The Evolving Earth

Editor: L. R. M. Cocks

The Evolving Biosphere

Editor: P. L. Forey

In the first volume, *The Evolving Earth*, twenty scientists have been asked to review the present state of knowledge in their particular field, ranging from the origin of the Earth, through ocean sediments and soils to continental drift and palaeogeography.

In the companion volume, *The Evolving Biosphere*, museum scientists have chosen an evolutionary concept—speciation, coevolution, biogeography etc. and related this to the group of animals or plants in which they are specialising. Thus beetles and birds exemplify sympatric and allopatric speciation, butterflies mimicry and certain fishes explosive evolution.

In both volumes the text is supplemented by over one hundred specially commissioned pieces of two-colour artwork.

These two books will be invaluable to all sixth-form and undergraduate biology and geology students.

The Evolving Earth: 276 × 219 mm, 280pp, 138 line illustrations, 42 halftones

The Evolving Biosphere: 276 × 219 mm, approx. 320pp, 133 line illustrations

Published: May 1981

Co-published by the British Museum (Natural History), London and Cambridge University Press, Cambridge.

Titles to be published in Volume 46

The generic and tribal classification of spore-feeding Thysanoptera (Phlaeothripidae: Idolothripinae).
By L. A. Mound & J. M. Palmer.

A revision of the Afrotropical mole-crickets (Orthoptera: Gryllotalpidae).
By B. C. Townsend.

Key to the genera of galerucine beetles of New Guinea, with a review of *Sastra* and related new taxa (Chrysomelidae).
By Sharon L. Shute.

The Afrotropical dacetine ants (Formicidae).
By Barry Bolton.

Photoset by Rowland Phototypesetting Ltd, Bury St Edmunds, Suffolk
Printed in Great Britain by Henry Ling Ltd., Dorchester

Bulletin of the British Museum (Natural History)

A revision of the Afrotropical mole-crickets (Orthoptera: Gryllotalpidae)

B. C. Townsend

Entomology series
Vol 46 No 2

26 May 1983

The *Bulletin of the British Museum* (*Natural History*), instituted in 1949, is issued in four scientific series, Botany, Entomology, Geology (incorporating Mineralogy) and Zoology, and an Historical series.

Papers in the *Bulletin* are primarily the results of research carried out on the unique and ever-growing collections of the Museum, both by the scientific staff of the Museum and by specialists from elsewhere who make use of the Museum's resources. Many of the papers are works of reference that will remain indispensable for years to come.

Parts are published at irregular intervals as they become ready, each is complete in itself, available separately, and individually priced. Volumes contain about 300 pages and several volumes may appear within a calendar year. Subscriptions may be placed for one or more of the series on either an Annual or Per Volume basis. Prices vary according to the contents of the individual parts. Orders and enquiries should be sent to:

Publications Sales,
British Museum (Natural History),
Cromwell Road,
London SW7 5BD,
England.

World List abbreviation: *Bull. Br. Mus. nat. Hist.* (Ent.)

The Entomology series is produced under the general editorship of the
Keeper of Entomology: Laurence A. Mound
Assistant Editor: W. Gerald Tremewan

ISSN 0524–6431

Entomology series
Vol 46 No 2 pp 175–203

British Museum (Natural History)
Cromwell Road
London SW7 5BD

Issued 26 May 1983

A revision of the Afrotropical mole-crickets (Orthoptera: Gryllotalpidae)

B. C. Townsend

Department of Entomology, British Museum (Natural History), Cromwell Road, London SW7 5BD

Contents

Synopsis

The 12 Afrotropical species of Gryllotalpidae, all members of *Gryllotalpa*, are revised, with six new species, one new synonymy, and one species revalidated. The songs of five of these species, and that of an Oriental species, are described for the first time. Keys are provided to the two subfamilies and five genera of Gryllotalpidae. *Gryllotalpa minuta* Burmeister, previously thought to occur in Africa, is shown to be absent there.

Introduction

The Gryllotalpidae, or mole-crickets, occur throughout the tropical and warmer temperate regions of the world. They are closely related to the Gryllidae, the true crickets, from which they differ mainly in being highly specialised for a subterranean existence. The fore legs are modified for digging, and bear two to four strongly sclerotised dactyls, and the body is covered in a dense mat of hair. Mole-crickets dig a complex of burrows within which they live, feed, sing, mate and breed, and which includes a nest chamber and a special singing burrow. They fly only rarely, usually to search for a mate. Specimens are most commonly taken at night during such flights, and often a high proportion of those so captured are females. The diet of mole-crickets varies according to the species (Matheny, 1981); they may be mainly carnivorous, mainly vegetarian or truly omnivorous. The life cycles of all the African species are totally unknown.

Several species of *Gryllotalpa*, in common with those of other gryllotalpid genera, become serious crop pests when occurring in large numbers (see, for example, Vayssière & Mimeur, 1925). Even species which are principally carnivorous can cause extensive mechanical damage to crops by their burrowing activities (Matheny, 1981). Mole-crickets have been reported as damaging tobacco, rice, sugar cane, potatoes and other crops, as well as lawns, seed beds and ornamental plants. Since most of the common African, Asian and Australian species have

previously been lumped together under the name '*Gryllotalpa africana*', it is usually this species which is blamed for the damage. However, this study has shown that true *africana* does not occur outside Africa, and even in Africa it is likely that other species also cause damage. Since different species seem to require different soil conditions, particularly with respect to moisture content (Bennet-Clark, 1970), it is likely that crops requiring different soil conditions will be affected by different species. For example, a species occurring in very wet conditions might be found damaging rice crops, but is unlikely to affect potatoes. It is hoped that the present study will facilitate investigation of the relative economic importance of the various species.

Material

In addition to material in the British Museum (Natural History), I have examined specimens from a number of other depositories, through the kindness of the specialists mentioned. The most important and numerous were from the Musée Royal de l'Afrique Centrale, Tervuren. The depositories from which I have seen material are listed below, together with the abbreviations I have used for them.

ANS	Academy of Natural Sciences of Philadelphia, U.S.A.
BMNH	British Museum (Natural History), London, England
IAR	Institute of Agricultural Research, Samaru, Nigeria
IRSNB	Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium
MNH	Muséum d'Histoire Naturelle, Geneva, Switzerland
MLU	Martin-Luther-Universität, Halle, East Germany
MNHN	Muséum National d'Histoire Naturelle, Paris, France
MNHU	Museum für Naturkunde der Humboldt-Universität, Berlin, East Germany
MRAC	Musée Royal de l'Afrique Centrale, Tervuren, Belgium
MZSUS	Museo Zoologico della Specola, Università degli Studi, Florence, Italy
NM	Naturhistorisches Museum, Vienna, Austria
NMK	National Museum of Kenya, Nairobi, Kenya
SAM	South African Museum, Cape Town, South Africa
TM	Transvaal Museum, Pretoria, South Africa
UZM	Zoologisk Museum, Copenhagen, Denmark
ZL	Zoologisk Laboratorium, Aarhus University, Aarhus, Denmark

I have examined the types of all the described species except those of *minor* and *africana*, which must be considered lost. The type-series of *minor* is in neither the MNHU, nor the ZM, between which the collection containing it was divided; and that of *africana* is not in the MNHN where Palisot de Beauvois' collection is deposited.

I have also examined seven specimens labelled as syntypes of *G. orientalis* Burmeister: two males and two females from the MLU, and one male and two females from the MNHU. Of these, only the three from the MNHU have data agreeing with the original description. I am here designating as LECTOTYPE the male, which was originally from The Tranquebar Museum and was collected in Manila, Philippines.

Taxonomic characters

The main characters used here for distinguishing between species are the male stridulatory file and the venation of the male fore wing. The male genitalia, which are usually a valuable character in the Gryllidae, are less useful in the African *Gryllotalpa*, except for the characteristic genitalia of *africana*. The females are largely indeterminable, and no key to them is given, although those of some species can be recognised with practice.

The shape and length of the dactyls of the fore tibiae, often used in the past, do not provide reliable taxonomic characters. Although they show some variation between species, the dactyls evidently wear down considerably with use.

The stridulatory file of the female shows great intra-specific variation, and does not appear to be useful in distinguishing between species. Although female mole-crickets are known to stridulate, the sounds they produce are not pure frequencies, and are probably not used for mate recognition.

Most African species of *Gryllotalpa* apparently occur only in the macropterous form, in which the hind wings extend well beyond the tip of the abdomen in dried specimens. However, all specimens of *microptera* and some of *debilis* are micropterous, their hind wings being shorter than the abdomen, and often shorter than the fore wings.

Methods

The stridulatory file was examined directly using a binocular microscope. It was exposed by raising the uppermost fore wing, usually the right one, after relaxing it with a few drops of 10% ammonia solution to which a little detergent had been added. Drawings of the file were prepared, using a microprojector, from replicas made using the method described by Ragge (1969: 172) for Tettigoniidae. The terminology used for the wing venation is that of Ragge (1955).

All drawings other than those of the stridulatory files were made using a Wild M5 microscope and camera lucida. Brief diagnoses of previously described species are given, and all new species are described in full.

Genitalia preparations were made in the following way. The tip of the abdomen was relaxed using a drop or two of distilled water, together with steam from a water bath. A longitudinal mid-ventral incision was made along the last three or four abdominal sternites. The viscera were removed and cleared in cold 20% KOH, and rinsed several times in distilled water. The genitalia were separated out, and eventually preserved in a tube of glycerine pinned underneath the specimen.

For identification purposes, the characteristic long ventral processes of *africana* (Figs 3, 4) may be exposed in situ, after the tip of the abdomen has been relaxed, by pulling back the subgenital plate and the covering membrane. The term 'ventral process' is used in the absence of established terminology for gryllotalpid genitalia or any clear homology with parts of gryllid genitalia.

The term 'stridulatory area' is used for the pair of large cells of the male fore wing, the anterior of which is the harp.

The dimensions of the stridulatory area and stridulatory file were measured using a Vickers Steros II microscope with eyepiece graticule. The length of the stridulatory area was taken to be equal to the length of the harp, and the width of the area was measured at its maximum.

All other measurements were made using vernier callipers. The body length was measured from the front of the head to the tip of the abdomen. This measurement is influenced both by the attitude of the head and by the degree of shrinkage of the abdomen in drying, and is therefore less reliable than the other measurements given. In most cases, 50 males and 50 females of each species were measured, where these were available. All measurements are given in millimetres.

The oscillograms shown in Figs 52–63 were made using a Mingograf 34T. The following acoustic terms are used in song descriptions. A syllable is the sound produced by a single wing stroke, and an echeme is a discrete group of syllables. The syllable repetition rate is the number of syllables per unit time, and in complex songs it is measured within a single echeme. The echeme repetition rate is the number of echemes per unit time. These definitions are those of Broughton (1964; 1976), and are illustrated in Fig. 52. The carrier frequency is the frequency within each syllable, and is probably equal to the tooth impact rate (Sismondo, 1979). This is the frequency of the musical note heard.

Information on distributions is based entirely on specimens studied. Previously published records are considered unreliable. The term 'Afrotropical Region' is used here but excludes the Malagasy Region, and many of the offshore islands are not specifically treated due to lack of material.

My approach is entirely phenetic, with no attempt to trace any possible phylogenetic relationships.

GRYLLOTALPIDAE Leach

Gryllotalpida Leach, 1815: 119. Type-genus: *Gryllotalpa* Latreille.
Scariphasteae Fieber, 1851: 17. [Not based on the name of a contained genus and therefore unavailable under Article 11(e) of the *International Code of Zoological Nomenclature.*]
Gryllotalpina; Fieber, 1852: 6.
Gryllotalpiens; Saussure, 1874: 333.
Gryllotalpites; Saussure, 1874: 334.
Gryllotalpidae; Lopez-Seoane, 1878: 375.
Gryllotalpinae; Saussure, 1894: 199.
Gryllotalpini; Redtenbacher, 1900: 140.
Curtillinae 'A'; Kirby, 1906: 1. Type-genus: *Curtilla* Oken.
Curtillidae; Bruner, 1915: 259.
Gryllotalpoidea; Karny, 1907: 32.

♂ ♀. Head with two ocelli and two compound eyes. Fore legs highly modified for digging, tibiae bearing two to four dactyls. Male fore wings lacking mirror. Ovipositor absent.

Discussion. The Gryllotalpidae consist of five easily recognisable genera. Two of these, *Neocurtilla* and *Gryllotalpella*, are restricted to the New World. One mainly New World genus, *Scapteriscus*, has two representatives in the Oriental region. The remarkable genus *Triamescaptor* contains a single, wholly apterous species found only in New Zealand. All the remaining species belong to the largest, entirely Old World genus *Gryllotalpa*.

Although the Gryllotalpidae have not usually been subdivided, some authors (Zeuner, 1939; Ragge, 1955; Vickery, 1977) have recognised two subfamilies, placing *Scapteriscus* in its own subfamily, Scapteriscinae, and leaving the remaining four genera in the Gryllotalpinae. This division is based on a difference in the origin of the basal spur of the fore leg, which arises from the trochanter in *Scapteriscus*, and from the femur in the other genera; I consider this division to be justified, and in the key to genera the two subfamilies are separated accordingly.

No major revisionary work on the African species has previously been undertaken. Scudder (1869) attempted a world revision of the group, but was apparently in possession of only three African specimens. Chopard (1968) recognised seven species from Africa. In the present revision, the number of known species is increased to twelve, of which six are new, and one new specific synonym is established. All species are placed in *Gryllotalpa*.

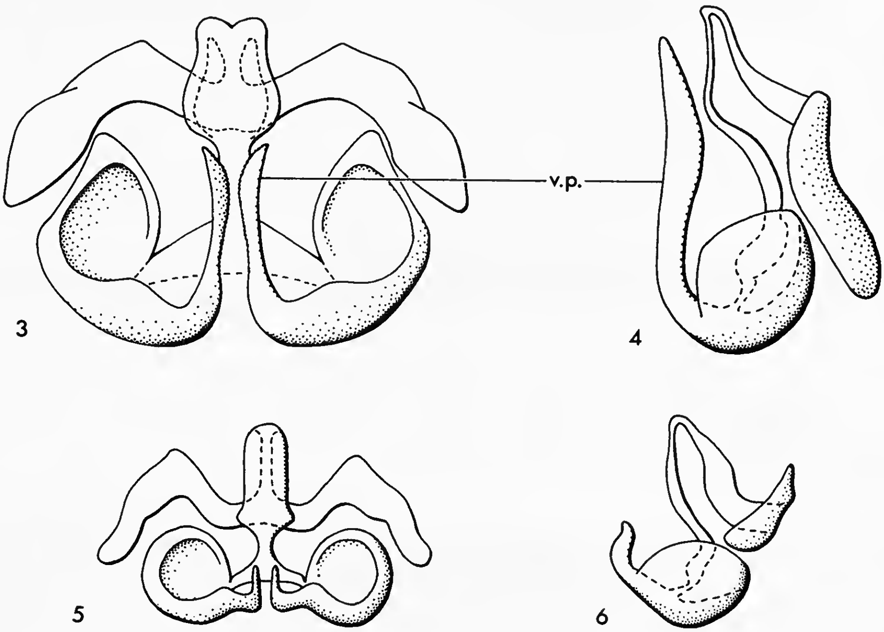
Kirby (1906) and Chopard (1955; 1968) placed the Old World *Gryllotalpa devia* Saussure and *Curtilla madecassa* Chopard in the otherwise New World genus *Neocurtilla*, because of the lack of spines on their hind tibiae. However, the armature of the hind tibiae is highly variable, and is generally an extremely unreliable character at specific, let alone generic, level. The main difference between *Gryllotalpa* and *Neocurtilla* is the orientation of the veins of the lateral field of the fore wing (Figs 1, 2), and both species have the *Gryllotalpa* condition. *G. madecassa* **comb. n.** is endemic to Madagascar, and as such is not included in this study. In size and wing venation it is more like the European *G. gryllotalpa* (L.) than any of the African species. *G. devia* is dealt with fully in the text.

1 2

Figs 1, 2 Lateral field of right male fore wing of (1) *Gryllotalpa africana*, (2) *Neocurtilla hexadactyla*.

Key to the subfamilies and genera

1 Basal spur of fore leg arising from femur; fore tibia with 3 or 4 dactyls (Gryllotalpinae) 2
– Basal spur of fore leg arising from trochanter; fore tibia with 2 dactyls. New World & India (Scapteriscinae) .... ***SCAPTERISCUS*** Scudder
2 Fore tibia with 4 dactyls; fore and hind wings present in both sexes 3
– Fore tibia with 3 dactyls; both sexes apterous. New Zealand .... ***TRIAMESCAPTOR*** Tindale
3 Fore tibia with covered tympanum, opening in the form of a slit; stout-bodied insects 4
– Fore tibia with exposed tympanum; slender, delicate insects. South America ***GRYLLOTALPELLA*** Rehn
4 Veins of lateral field of fore wing as in Fig. 1, all pointing towards wing-tip. Old World ***GRYLLOTALPA*** Latreille
– Veins of lateral field of fore wing as in Fig. 2, the more distal ones pointing towards the wing-base. New World .... ***NEOCURTILLA*** Kirby



Figs 3–6 Male genitalia of (3) *Gryllotalpa africana*, ventral view, (4) *G. africana*, lateral view, (5) *G. robusta*, ventral view and (6) *G. robusta*, lateral view. v.p. = ventral process.

GRYLLOTALPA Latreille

Gryllotalpa Latreille, 1802: 275. Type-species: *Gryllus Acheta gryllotalpa* Linnaeus, by monotypy.
Curtilla Oken, 1815: 445. Type-species: *Gryllus Acheta gryllotalpa* Linnaeus, by monotypy.
Austrotalpa Mjöberg, 1913: 30. Type-species: *Austrotalpa pluvialis* Mjöberg [= *Gryllotalpa nitidula* Serville], by monotypy. [Synonymised by Tindale, 1928: 4.]

♂ ♀. Fore tibiae with four dactyls. Tympana covered, opening in the form of a slit. Basal spur of fore leg arising from femur. Fore and hind wings present. Veins of lateral field of fore wings all pointing towards wing-tips.

Discussion. The African species of *Gryllotalpa* fall into two quite distinct groups. In male fore wings of the *africana*-group, comprising *africana, bulla, debilis, devia, robusta* and *rufescens*, the stridulatory teeth are much more widely spaced at the centre of the file than at its extremities, and the radius is divided distally into two branches. In male fore wings of the *parva*-group, comprising *brevilyra, elegans, microptera, parva, pluridens* and *spissidens*, the stridulatory teeth are more or less evenly spaced, and the radius is undivided. These characters are constant in all

species except *rufescens*, and possibly *devia*, in which the form of the radius is somewhat variable; these two species are placed in the first group on the basis of their stridulatory files. The form of the radius of the females is similar to that of the males, but is rather inconsistent, and is not a reliable character for identification purposes.

The species of *africana*-group are separated by a variety of male characters, as indicated in the key; those of *parva*-group chiefly by the shape of the stridulatory area. A large proportion of the females of *rufescens, spissidens* and *elegans* may be identified with practice using characters mentioned under those species, but females of the other species cannot be reliably identified. The females of *devia* and *bulla* are unknown.

DISTRIBUTION. Throughout the tropical and warmer temperate regions of the Old World.

Synonymic list of the Afrotropical species

africana-group
- ***africana*** Palisot de Beauvois
  - *colini* Rochebrune
  - *confusa* Chopard **syn. n.**
  - *fossor* Scudder
- ***bulla*** **sp. n.**
- ***debilis*** Gerstaecker **sp. rev.**
  - *minor* Brunn
- ***devia*** Saussure **comb. rev.**
- ***robusta*** **sp. n.**
- ***rufescens*** Chopard

parva-group
- ***brevilyra*** **sp. n.**
- ***elegans*** Chopard
- ***microptera*** Chopard
- ***parva*** **sp. n.**
- ***pluridens*** **sp. n.**
- ***spissidens*** **sp. n.**

Non-Afrotropical species of *Gryllotalpa* also covered

madecassa Chopard **comb. n.** (p. 178)
mintua Burmeister (p. 185)
orientalis Burmeister (pp. 176, 183)

Key to the Afrotropical species

Males

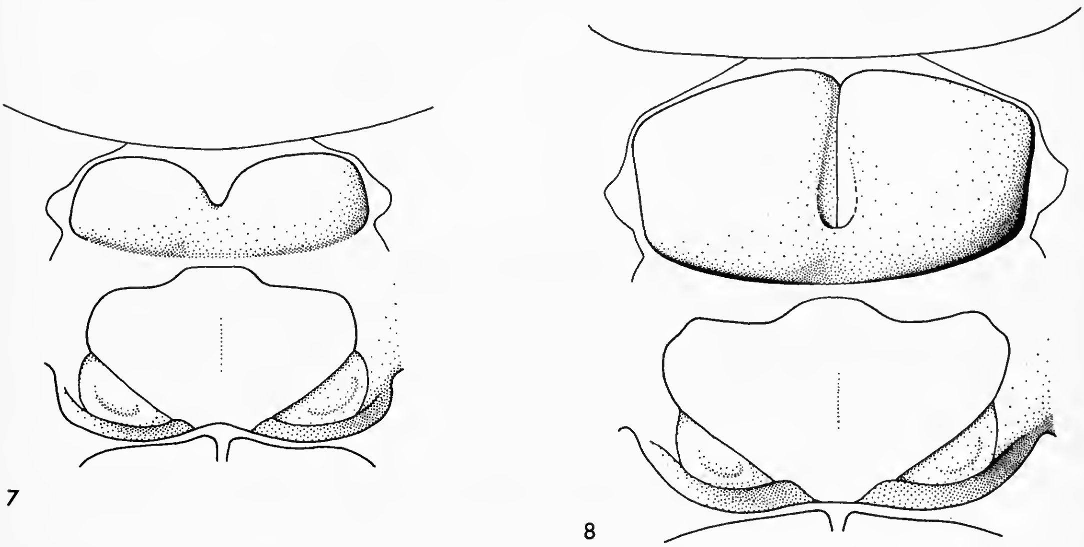
1 Stridulatory teeth much more widely spaced at centre of file than at ends (Figs 9–15). Radius of fore wing of macropterous specimens usually divided distally into R_1 and R_s (Figs 22–27) (*africana*-group) 2
– Stridulatory teeth fairly evenly spaced (Figs 16–21). Radius of fore wing of macropterous specimens never divided (Figs 29–33) (*parva*-group) 7
2 Stridulatory area very oblong (Figs 22, 23, 25–28). Mesonotum covered by pronotum and base of fore wings, scutum never enlarged (Fig. 7) 3
– Stridulatory area almost square (Fig. 24). Mesonotum usually wholly or partly exposed, scutum usually enlarged (Fig. 8) .... ***G. bulla*** (p. 183)
3 Pronotum and legs plain brown, from light sandy-coloured to almost black, never rufous 4
– Pronotum and legs very conspicuously rufous brown 6
4 Genitalia about 3·0 mm long, with long ventral processes (Figs 3, 4) .... ***G. africana*** (p. 182)
– Genitalia about 1·5 mm long, with short ventral processes (Figs 5, 6) 5
5 Larger, stouter species, body length 21·3–43·6 mm. Length of fore wings 10·0–13·9 mm; width of stridulatory area 2·1–3·2 mm .... ***G. robusta*** (p. 186)
– Smaller, less stout species, body length 15·9–25·2 mm. Length of fore wings 4·4–11·0 mm; width of stridulatory area 1·0–2·2 mm .... ***G. debilis*** (p. 184)

6 Hind tibiae with 3–5 dorsal spines. Equatorial Africa .... ***G. rufescens*** (p. 189)
– Hind tibiae without dorsal spines. Southern Africa .... ***G. devia*** (p. 185)
7 Fore wings not reduced, more than 7 mm long, venation as in Figs 29–33. Hind wings long, extending well beyond tip of abdomen 8
– Fore wings much reduced, less than 7 mm long, venation as in Fig. 34. Hind wings vestigial, shorter than or a little longer than fore wings .... ***G. microptera*** (p. 193)
8 Stridulatory area not reduced, shaped as in Figs 29–31 or Fig. 33, 3·2–4·4 mm long; or if shorter, then density of teeth less than 35 per mm 9
– Stridulatory area reduced, shaped as in Fig. 32, 2·3–3·5 mm long; density of stridulatory teeth more than 35 per mm... ***G. brevilyra*** (p. 189)
9 Main veins and cross veins of apical field of fore wing more or less equally prominent. Stridulatory area as in Figs 29, 30 or 33 10
– Main veins of apical field of fore wing unusually prominent, cross-veins indistinct. Stridulatory area as in Fig. 30 or Fig. 31 12
10 Stridulatory file with less than 71 teeth, density of teeth 26·4–33·3 per mm. Stridulatory area as in Fig. 33 .... ***G. parva*** (p. 195)
– Stridulatory file with more than 71 teeth, density of teeth 30·4–45·2 per mm. Stridulatory area as in Fig. 29 or Fig. 30 11
11 Stridulatory area narrower, 1·8–2·2 mm wide, shaped as in Fig. 30. West Africa & Cameroon ***G. spissidens*** (part) (p. 200)
– Stridulatory area broader, 2·1–3·0 mm wide, shaped as in Fig. 29 .... ***G. pluridens*** (p. 197)
12 Density of stridulatory teeth less than 32 per mm. Stridulatory area as in Fig. 31. Zaire Basin ***G. elegans*** (p. 191)
– Density of stridulatory teeth more than 32 per mm. Stridulatory area as in Fig. 30. West Africa & Cameroon .... ***G. spissidens*** (part) (p. 200)

Females

Because the most useful characters in African *Gryllotalpa* are male sexual characters, identification of isolated females is invariably difficult and usually impossible. Even the form of the radius of the fore wing, although conforming to the same general pattern as that of the male, is not consistent enough in the female to provide a reliable character. Females of some species, however, may be recognised by a variety of non-sexual characters.

The female of *rufescens* can be recognised by its very conspicuous rufous-brown coloration (see couplet 3 of key to males). In addition, the fore wings are unusually long, often reaching the



7

8

Figs 7, 8 Meso- and metanotum of (7) *Gryllotalpa africana,* (8) *G. bulla.*

tip of the abdomen, with very straight and parallel veins (Fig. 37). The unknown female of *devia* is probably similar, but lacking dorsal spines on the hind tibiae.

Females of the allopatric (Fig. 50) *elegans* and *spissidens* have characteristically prominent fore wing veins on the dorsal field, with cross-veins indistinct or absent, although this character is often not well marked in *spissidens*.

Females of *microptera* and micropterous females of *debilis* have characteristically short fore and hind wings. Macropterous females of *debilis* are similar to *parva* and *brevilyra*. *africana*, *robusta* and *pluridens* are generally larger than these three, but are indistinguishable from each other. *pluridens* has a rather more restricted distribution than *africana* and *robusta*.

The female of *bulla* is so far unknown. If it has the same remarkable form of the metascutum as the male (Fig. 8), it should not be hard to recognise.

Descriptions of the Afrotropical species

The *africana*-group

Gryllotalpa africana Palisot de Beauvois

(Figs 1, 3, 4, 7, 15, 25, 38, 48, 55, 61)

Gryllotalpa africana Palisot de Beauvois, 1805: 229. Syntypes, NAMIBIA (lost) (see p. 176). NEOTYPE ♂, SOUTH AFRICA (ANS), here designated [examined].
Gryllotalpa fossor Scudder, 1869: 21. LECTOTYPE ♂, SOUTH AFRICA (ANS), here designated [examined]. [Synonymised by Chopard, 1968: 450.]
Gryllotalpa colini Rochebrune, 1884: 30. LECTOTYPE ♀, SENEGAL (MNHN), here designated [examined]. [Synonymised by Chopard, 1968: 450.]
[*Gryllotalpa formosana* Shiraki; Chopard, 1934: 14. Misidentification.]
Gryllotalpa confusa Chopard, 1967: 776. LECTOTYPE ♂, ZAIRE (IRSNB), here designated [examined]. **Syn. n.**

DIAGNOSIS. ♂. Venation of right fore-wing as in Fig. 25, R_1 and R_s separated distally. Stridulatory file of right fore wing as in Fig. 15 with 25–52 teeth (mean of 50 examined: 34·6) more widely spaced in centre of file than at ends, 11·4–20·8 per mm (mean of 50 examined: 15.6). Genitalia very large, with long ventral processes (Figs 3, 4). Song as in Figs 55, 61, a continuous thrill, mean syllable repetition rate 49·1–57·8/s, mean carrier frequency 2·1–2·4 kHz (based on 4 recordings).

♀. Right fore wing as in Fig. 38, R_1 and R_s separated distally.

MEASUREMENTS

	Males	Females
Body length	(50): 22·0–35·0, mean 28·4	(50): 21·9–33·0, mean 28·3
Median length of pronotum	(50): 7·5– 9·9, mean 8·6	(50): 7·6– 9·7, mean 8·6
Length of hind femur	(50): 7·2–10·4, mean 8·6	(50): 7·0– 9·9, mean 8·5
Length of fore wing	(50): 9·6–13·9, mean 12·0	(50): 9·2–14·8, mean 11·9
Length of stridulatory area	(50): 3·9– 5·8, mean 4·9	
Width of stridulatory area	(50): 2·1– 2·7, mean 2·4	
Length of stridulatory file	(50): 1·6– 2·5, mean 2·2	

DISCUSSION The identity of *africana* cannot be established from Beauvois' original description, which applies equally well to any African species. In the past, its identity has been far from settled, although two distinct genitalic forms have long been recognised among African specimens similar in external morphology; one is small and has short ventral processes typical of the genus (Figs 5, 6), the other is much larger and has long ventral processes (Figs 3, 4). Chopard (1939) referred to the first, typical form as *fossor* Scudder, and the second, atypical one as *africana*. Later (1967), following Saussure & Zehntner (1894), he called the typical form *africana*, and gave the atypical form a new name, *confusa*. In 1968 he synonymised *fossor* with *africana*.

However, two important facts have emerged in the course of this study. Firstly, the single species having the atypical genitalic form is by far the commonest species occurring in Africa, comprising about one-third of all the specimens examined. Secondly, the type-locality for

africana is 'Royaume Oware', apparently referring to the region of the Oware River, a seasonal river running into the Etosha Pan of northern Namibia; the only specimens I have seen from this area, from the collection of the ANS, are from the Etosha Pan itself, and have the atypical genitalic form.

For these reasons I am considering the species having the atypical form of genitalia (Figs 3, 4) to be *africana*. This preserves the traditional position of *africana* as Africa's commonest *Gryllotalpa*, ensures the greatest possible stability in the nomenclature, and is most likely to be true to Palisot de Beauvois' syntypes.

Although the specimens from the Etosha Pan are nearest to the type-locality, they are unusually small for the species (body length 22·0–27·7 mm), perhaps as a result of the hostile environment. In addition, recent research has shown that the song is often the most important single character in the Grylloidea, so that where possible type-specimens should be selected from populations from which song recordings have been made. For these reasons, I have selected as neotype a male from such a population at Howick, South Africa, in preference to the specimens from Etosha Pan.

Contrary to the belief of most previous authors, the single male syntype of *fossor*, here designated lectotype, possesses the atypical genitalic form. *fossor* is therefore a synonym of *africana*, as is *confusa*.

The difference in genitalic structure between *G. africana* and the other species may be related to a difference in copulatory behaviour (Alexander, 1962). A series of specimens in the BMNH from Nurtiti, Sudan is labelled as 'damaging potatoes'.

G. colini is included as a synonym of *africana*; the female lectotype cannot be definitely identified, but is most likely to belong to this species. The female paralectotype of *colini*, and that of *fossor*, are indeterminable.

MATERIAL EXAMINED

Gryllotalpa africana Beauvois, neotype ♂, **South Africa**: Natal, Mkuze Game Reserve, Nsumu Pan, 19.xi.1980 (*Otte*) (ANS). *Gryllotalpa fossor* Scudder, lectotype ♂, **South Africa**: Cape of Good Hope (ANS,). *Gryllotalpa colini* Rochebrune, lectotype ♀, **Senegal**: Kita, 1904 (*Mabille*) (MNHN). *Gryllotalpa confusa* Chopard, lectotype ♂, **Zaire**: Rutshuru, 16–30.x.1934 (*de Witte*) (IRSNB).

Zaire: 1 ♀, Rutshuru, 17–24.vi.1934 (*de Witte*); 1 ♂, Bitashimwa, Sesero, 17.viii.1934 (*de Witte*); 1 ♀ Kahojo, 16.ii.1934 (*de Witte*); 1 ♀, S. Bishoke, 2400 m, 8–19.ii.1935 (*de Witte*); 3 ♂, Lac Mugunga, Nzulu, 1500 m, 25.i.1934 (*de Witte*) 1 ♀, Kibati, 1700 m, 17.i.1934 (*de Witte*); 1n Camp Ruindi, 1000 m, 20–28.xi.1934 (*de Witte*); 3 ♂, 3 ♀, Lac Mugunga, Nzulu, 1500 m, 25.i.1934 (*de Witte*) (MRAC). (All paralectotypes of *Gryllotalpa confusa* Chopard.) In IRSNB unless otherwise stated.

In addition, about 600 adults from localities too numerous to list, from the following countries: South Africa, Namibia, Zimbabwe, Mozambique, Zambia, Angola, Tanzania, Kenya, Uganda, Rwanda, Zaire, Somalia, Ethiopia, Sudan, Cameroon, Nigeria, Benin, Ghana, Liberia, Senegal, Socotra.

DISTRIBUTION (Fig. 48). Throughout the African continent, north to Egypt, Libya and Morocco, and also in the Canary Islands. Although previously thought to occur throughout the Old World tropics and sub-tropics, *africana* does not occur in Australia (Dr D. Otte, pers. comm.), and in Asia and Indonesia it is apparently replaced by *G. orientalis*, previously thought to be a synonym of *africana*. Its presence in southern Spain, Saudi Arabia and the Malagasy Region is likely, but unconfirmed.

Gryllotalpa bulla sp. n.

(Figs 8, 11, 24, 49, 53, 59)

♂. Fairly uniform brown in colour, veins of fore wings darker, slightly rufous. Pronotum not unusually large compared with head. Mesoscutum more or less exposed between pronotum and base of fore wings, often greatly enlarged (Fig. 8). Fore wings broad; venation of right fore wing as in Fig. 24; stridulatory area very broad, almost square; radius divided distally into R_1 and R_s. Stridulatory file of right fore wing as in Fig. 11, with 35–49 teeth (mean of 9 examined: 41·3) more widely spaced in centre of file than at ends, 12·9–15·2 per mm (mean of 9 examined: 14·1). Hind wings long, extending well beyond tip of abdomen. Hind tibiae armed above with 1–4 spines on internal margin, or unarmed. Genitalia similar to *robusta* (Figs

5, 6). Song as in Figs 53, 59, a continuous trill; mean syllable repetition rate 128·5/s, mean carrier frequency 4·8 kHz (based on 1 recording).

♀ unknown.

MEASUREMENTS

	Males
Body length	(8): 27·7–32·8, mean 27·3
Median length of pronotum	(9): 7·4– 8·8, mean 8·3
Length of hind femur	(9): 6·6– 7·8, mean 7·3
Length of fore wing	(9): 11·5–13·3, mean 12·3
Length of stridulatory area	(9): 3·8– 4·5, mean 4·2
Width of stridulatory area	(9): 2·9– 3·3, mean 3·1
Length of stridulatory file	(9): 2·4– 3·5, mean 2·9

DISCUSSION. This species is remarkable in the form of the mesonotum (Fig. 8); the scutum is sometimes greatly enlarged, and this is the only species in which it is exposed. In all other species the pronotum and base of the fore wings cover the scutum.

The single male from Kenya excluded from the type-series differs in having a longer stridulatory area (6·3 mm) and fewer (23), less densely packed stridulatory teeth (6·6 per mm). This specimen may represent an extreme variant, or a separate species. A recording of the song of this form might confirm its status.

MATERIAL EXAMINED

Holotype ♂, **Tanzania**: Serengeti N.P., Seronera, 14.x.1980 (*Otte*) (ANS).

Paratypes. **Zaire**: 3 ♂, Katanga, Lubumbashi ('Elisabethville'), 1911, xi.1911, 1930 (*Buttgenbach, Miss. Agric., Lamoral*) (MRAC; BMNH); 1 ♂, Kapiri, ix.1912 (*Miss. Agric.*) (MRAC); 5 ♂, Katanga, Kasenia, 15.ix.–15.x.1930 (*de Witte*) (MRAC; BMNH).

Material excluded from the type-series. **Kenya**: 1 ♂, Masai Reserve, 7.ii.1935 (*Benson*) (UZM).

DISTRIBUTION (Fig. 49). Central and East Africa; holotype found in very wet soil.

Gryllotalpa debilis Gerstaecker **sp. rev.**

(Figs 13, 14, 27, 28, 40, 41, 48)

Gryllotalpa debilis Gerstaecker, 1869: 211. Holotype ♂, TANZANIA (MNHU) [examined]. [Synonymised with *G. minuta* by Chopard, 1968: 451.]

Gryllotalpa minor Brunn, 1901: 276. Syntypes, TANZANIA (lost) (see p. 176). NEOTYPE ♂, TANZANIA (MNHU), here designated [examined; same specimen as holotype of *G. debilis* Gerstaecker, 1869: 211]. [Synonymised with *G. minuta* by Chopard, 1968: 451.]

DIAGNOSIS. ♂. Venation of right fore wing as in Figs 27, 28, R_1 and R_s separated distally. Stridulatory file of right fore wing as in Figs 13, 14, with 21–48 teeth (mean of 50 examined: 31·5) more widely spaced in centre of file than at ends, 11·6–30·0 per mm (mean of 50 examined: 19·6). Hind wings variable, sometimes extending well beyond tip of abdomen, sometimes slightly shorter than fore wings, more often intermediate. Hind tibiae armed above with 2–4 spines on internal margin. Genitalia similar to *robusta* (Figs 5, 6).

♀. Right fore wing as in Figs 40, 41, R_1 and R_s separated distally.

MEASUREMENTS

	Males	Females
Body length	(50): 15·9–25·2, mean 20·8	(50): 19·2–26·5, mean 22·9
Median length of pronotum	(50): 5·2– 8·2, mean 6·7	(50): 6·1– 7·9, mean 7·0
Length of hind femur	(50): 5·1– 7·6, mean 6·4	(50): 5·9– 7·9, mean 6·6
Length of fore wing	(50): 4·4–11·0, mean 7·9	(50): 3·9–10·2, mean 7·9
Length of stridulatory area	(50): 2·3– 4·6, mean 3·6	
Width of stridulatory area	(50): 1·0– 2·2, mean 1·7	
Length of stridulatory file	(50): 1·2– 2·5, mean 1·6	

DISCUSSION. *G. debilis* is very similar to *robusta* (see p. 186), but is smaller and less stout. Both species show unusually wide variations in minor characters such as colour, colour pattern, size

and shape, and in the form of the stridulatory area and stridulatory file, suggesting that they may in fact be complexes of several very similar species. However, I have not been able to subdivide them satisfactorily on the basis of morphological characters.

This species has been confused with *G. minuta*, from which it differs chiefly in the smaller number of stridulatory teeth (number on holotype of *minuta*: 63). *minuta* is common in the Oriental region, but does not occur in Africa.

The type-series of *minor* was from Zanzibar, the type-locality of *debilis*, and since these two names have been associated for several years, I have decided to treat them as synonyms. In order to establish their synonymy firmly, I have designated the holotype of *debilis* as neotype of *minor*, the name *debilis* taking priority.

G. debilis is also morphologically indistinguishable from *G. orientalis*. The two may be synonymous, and if so this would apparently be the only species of *Gryllotalpa* common to the Afrotropical and Oriental regions. The two taxa are treated as specifically distinct until a recording of the song can be compared with that of *orientalis* (Figs 57, 63).

G. debilis is the only Afrotropical species of which both macropterous and micropterous forms are known. The micropterous form is superficially similar to *microptera*, but differs in the form of the stridulatory file (Figs 14, 19), and in having the radius divided distally into R_1 and R_s.

MATERIAL EXAMINED

Holotype ♂, **Tanzania**: Zanzibar (MNHU).

Zambia: 3 ♂, 5 ♀, 1n, Lake Bangweulu, Mbawala Is., x.–xi.1946 (*Steele*) (BMNH). **Namibia**: 1 ♂, Naukluft, 1300–1500 m, 7–10.xii.1933 (*Jordan*) (BMNH). **Uganda**: 1 ♂, Mwiri, Turtle Pool, 20.xi.1954 (*Corbet*) (BMNH). **Zaire**: 1 ♂, Bas-Kasai, ix.1920 (*Vanderijst*); 1 ♂, Equateur, Boende, 13.iv.1926 (*Hulstaert*); 2 ♂, Sankuru, Komi, iv.–v.1930 (*Ghesquière*); 1 ♂, Katanga, Katompe, 1–15.vi.1930 (*Gérard*); 1 ♂, Eala, 22.x.1931 (*Brédo*); 1 ♀, Ruwenzori, Mutwanga, ii.–iii.1937 (*Hackars*); 3 ♂, 1 ♀, Mutsora, 1939 (*Hackars*) (IRSNB); 1 ♂, 3 ♀, Kasika, R. Ngombe, 8–10.vi.1949 (*Laurent*); 64 ♂, 111 ♀, Upemba NP, Ganza, 8.vi.1949, 5.vii.1949 (*de Witte*) (15 ♂, 23 ♀ in BMNH); 9 ♂, 1 ♀, Garamba NP, xi.1949, 2.i.1950, 6.i.1950, 18.viii.1950, 6.x.1951, 28.xi.1951, 21.viii.1952 (*Demoulin, De Saeger*) (1 ♂ in BMNH); 1 ♂, Kwango, Popakabaka, i.1952 (*Pierquin*); 9 ♂ 12 ♀, 8 n, Albert NP, Ruwenzori Massif, near Kalonge, Kisesa, 23.v.1953 (*Vanschuytbroeck & Kekenbosch*) (3 ♂, 4 ♀, 2 nn in BMNH); 12 ♂, 4 ♀, 8 n, Albert NP, various localities, 2.iii.–23.vii.1957 (*Vanschuytbroeck*) (3 ♂ in BMNH); 3 ♂, 11 ♀, Stanley Pool, 3–10.x.1957, 7.x.1957 (*Bouillon*) (1 ♂, 2 ♀ in BMNH); 1 ♂, Mayumbe, Singa to Mbomba, T. Kipanzu, v.–vi.1958 (*Laurent*); 1 ♂, 3 ♀, Mayumbe, Vemba to Minionzi, T. Tshela, vi.–vii.1958 (*Laurent*). **Ethiopia**: 1 ♂, Adda shore of L. Hora Harsadi, 3.xii.1936 (*Omer-Cooper*) (BMNH). **Nigeria**: 1 ♂, Sokoto, 1921 (*Moiser*) (BMNH); 1 ♂, 1 ♀, Ibadan, i.–vi.1954 (*Clausen*) (UZM); 1 ♂, 8 ♀, Western Province, 3·5 miles N. of Oyo, near Idode, 16.xii.1960 (*Jago*) (BMNH); 1 ♂, Western Pronce, Ibadan, University College, 17.xii.1960 (*Jago*) (BMNH); 1 ♂, Zaria, Samaru, 1979 (*Deeming*) (IAR). **Ghana**: 1 ♂, Accra, Legon, 9.iii.1969 (*Richards*) (BMNH). **Chad**: 1 ♂, Bebedjia, xi.1965 (*Schmitz*). In MRAC unless otherwise stated.

DISTRIBUTION (Fig. 48). Tropical Africa; also known from Mauritius, Rodriguez, the Seychelles and Saudi Arabia. The record from Namibia, which is based on a single male in the BMNH, is in need of confirmation.

Gryllotalpa devia Saussure **comb. rev.**

(Figs 10, 22, 48)

Gryllotalpa devia Saussure, 1877: 25. Holotype ♂, SOUTH AFRICA (MHN) [examined].
Neocurtilla devia (Saussure) Kirby, 1906: 2.

DIAGNOSIS. ♂. Pronotum and legs rufous-brown, colour 38 (Tawny) or 40 (Cinnamon-Rufous) in Naturalist's Colour Guide (Smithie, 1975). Pronotum very large compared with head. Venation of right fore wing as in Fig. 22, radius divided distally into R_1 and R_s in holotype, possibly sometimes undivided as in *rufescens*. Stridulatory file of right fore wing as in Fig. 10, with 40 teeth, more widely spaced in centre of file than at ends, overall density 12 per mm. Hind tibiae without dorsal spines.

♀ unknown.

MEASUREMENTS

	Male holotype
Body length	35·0
Median length of pronotum	12·0
Length of hind femur	10·0
Length of fore wing	15·0
Length of stridulatory area	5·8
Width of stridulatory area	3·7
Length of stridulatory file	3·3

DISCUSSION. Kirby (1906: 2) placed this species in his New World genus *Neocurtilla*, presumably because of the absence of dorsal spines on its hind tibiae. However, this is not a reliable generic character, and the venation of the lateral field of the fore wing clearly places *devia* in *Gryllotalpa* (see p. 178). The fragile condition of the holotype prevents examination of the genitalia, but those of the only other recorded specimen have been figured by Chopard (1955: fig. 16), and do not appear to have any unusual characteristics. The orientation of some of the stridulatory teeth appears to be reversed in the holotype (Fig. 10), but this may be abnormal.

MATERIAL EXAMINED

Holotype ♂, **South Africa**: Cape of Good Hope (MHN).

DISTRIBUTION (Fig. 48). Southern Africa, known only from the Cape of Good Hope and Lesotho. Apparently associated with drier regions than is usual for mole-crickets.

Gryllotalpa robusta sp. n.

(Figs 5, 6, 12, 26, 39, 49, 54, 60)

[*Gryllotalpa africana* Palisot de Beauvois; Saussure & Zehntner, 1894: 406; Chopard, 1967: 775. Misidentifications.]

[*Gryllotalpa fossor* Scudder; Chopard, 1939: 6. Misidentification.]

♂. Fairly uniform in colour, light brown to black, veins of fore wings darker. Pronotum not unusually large compared with head. Mesoscutum not exposed, concealed by pronotum and base of fore wings, never enlarged. Venation of right fore wing as in Fig. 26; stridulatory area more or less rectangular; radius divided distally into R_1 and R_s. Stridulatory file of right fore wing as in Fig. 12, with 30–42 teeth (mean of 7 examined: 35·7) more widely spaced in centre of file than at ends, 11·0–16·0 per mm (mean of 7 examined: 12·9). Hind wings long, extending well beyond tip of abdomen. Hind tibiae armed above with 2–4 spines on internal margin. Genitalia small, with short ventral processes (Figs 5, 6). Song as in Figs 54, 60, a continuous trill, mean syllable repetition rate 98·5/s, mean carrier frequency 1·6 kHz (based on 1 recording).

♀. Right fore wing as in Fig. 39, radius usually divided distally into R_1 and R_s.

MEASUREMENTS OF HOLOTYPE

Body length	:	35·2
Median length of pronotum	:	8·8
Length of hind femur	:	8·8
Length of fore wing	:	13·7
Length of stridulatory area	:	6·0
Width of stridulatory area	:	3·0
Length of stridulatory file	:	2·9

OVERALL MEASUREMENTS

Body length	(50): 21·3–35·2, mean 26·3	(11): 23·4–35·1, mean 29·5
Median length of pronotum	(50): 7·0–10·0, mean 8·0	(11): 6·6– 8·9, mean 8·0
Length of hind femur	(50): 6·7–10·0, mean 7·9	(11): 7·0–10·0, mean 8·6
Length of fore wing	(50): 10·0–13·9, mean 11·7	(11): 10·9–13·5, mean 11·7
Length of stridulatory area	(50): 4·0– 6·1, mean 5·1	
Width of stridulatory area	(50): 2·1– 3·2, mean 2·6	
Length of stridulatory file	(50): 1·6– 3·0, mean 2·3	
Number of stridulatory teeth	(50): 17·0–42·0, mean 29·4	

Overall density of stridulatory teeth (50): 9·0–18·0, mean 13·0

DISCUSSION. This is the most nondescript of all the African mole-crickets. It was previously confused with *africana*, and also misidentified as *fossor*, which is now a synonym of *africana*. Externally, it is indistinguishable from *africana* but lacks the characteristic male genitalia of that species (Figs 3–6) and differs radically from it in song (Figs 54, 55, 60, 61). It is also very similar to *debilis*, differing chiefly in its larger size and more robust shape.

Both *robusta* and *debilis* show a much greater range of variation in minor characters, and in the form of the stridulatory area and stridulatory file, than that normally found within a single species. These characters, such as colour, colour pattern, size and shape, appear to be quite consistent within single populations, and strongly suggest that both *robusta* and *debilis* are in fact complexes of several very similar species. However, I have been unable to subdivide them satisfactorily on the basis of the morphology.

Because of the similarities between *robusta* and *debilis* in major characters, particularly the fore wing venation and the gross form of the stridulatory file (Figs 12, 13, 14, 26, 27, 28), and because of the great variation within both taxa, a number of specimens cannot be definitely identified as one or the other. The changes in nomenclature adopted in this paper, which leave the present species without a name, offer an opportunity simply to treat the two taxa as a single species, under the name *debilis*. However, I have decided against this for the following reasons.

1. Such a step would involve combining two taxa previously recognised as separate. This would be misleading, in view of the evidence suggesting that there are more than two species, not less.

2. *debilis* is more similar to *orientalis* than to *robusta*, but *orientalis* and *robusta* have different songs (Figs 54, 57, 60, 63). This provides further circumstantial evidence for a specific difference between *debilis* and *robusta*, though the song of *debilis* itself is unknown.

3. The holotype of *robusta* is clearly different from that of *debilis*, and its song is known. Despite the variation within each taxon, and the areas of overlap between them, the majority of specimens can be assigned to one or the other on the basis of the characters described.

Because of the great variation involved, I have not designated paratypes of *robusta*. I have given separate series of measurements for the holotype, and for all the specimens grouped under *robusta*.

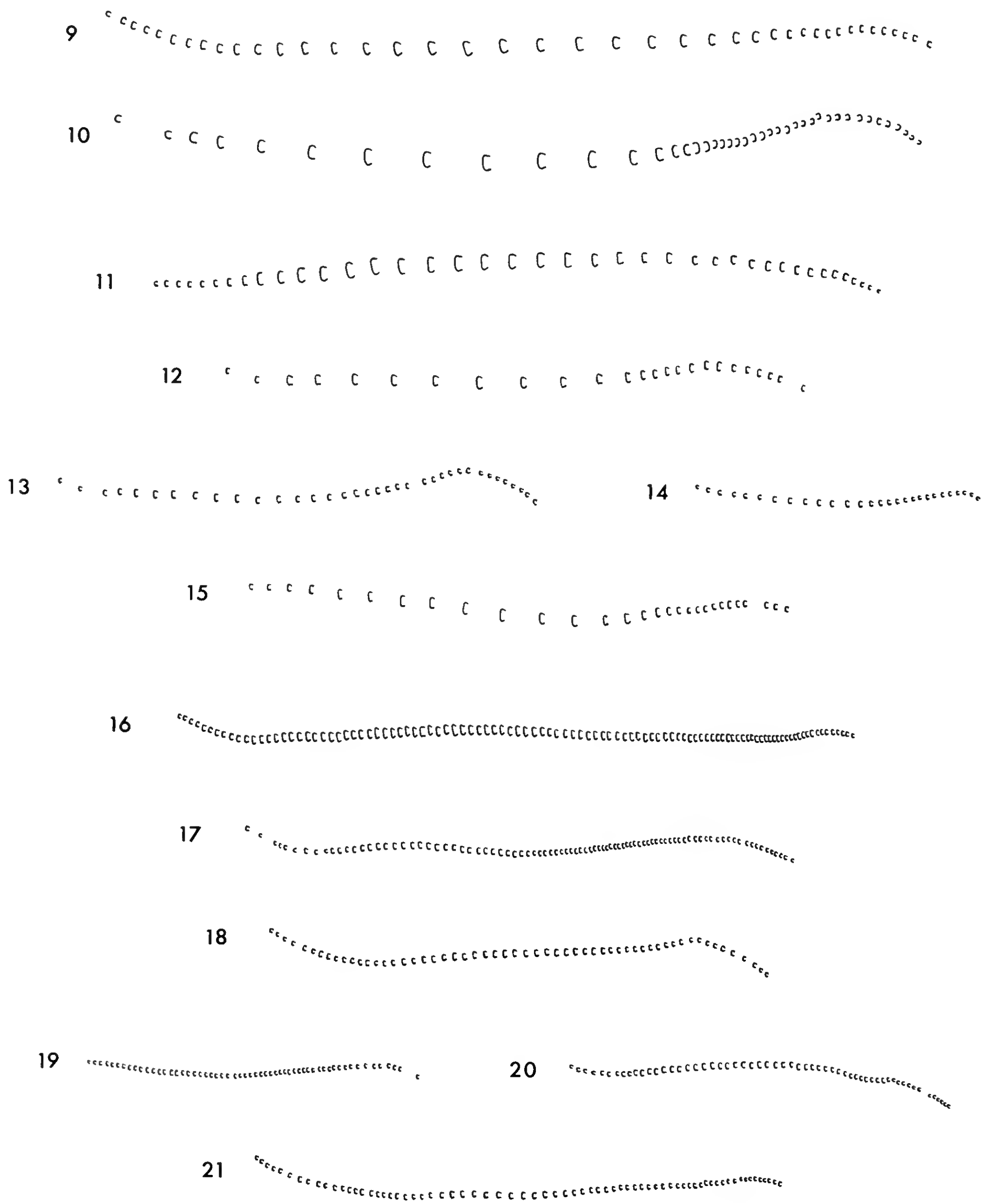
MATERIAL EXAMINED

Holotype ♂, **Tanzania**: Serengeti N.P., Musabi Plains, c. 30 miles NW. of Serona, 20.x.1980 (*Otte*) (ANS).

Material excluded from type-series. **South Africa**: 1 ♂, Kruger N.P., c. 70 miles N. of Skukuza, Olifant's Camp, 7.vii.1974 (*Pitkin*) (BMNH); **Tanzania**: 1 ♂, Ukerewe Is. (*Conrad*) (NMK); 1 ♂, Kabolo, 5.vii.1947 (*Poll*); 3 ♂, Sumbawanga, xii.1980 (*Moyer*) (BMNH). **Zambia**: 1 ♂, Lochimvar, 6–26.v.1964 (*Van Noten*). **Kenya**: 10 ♂, 1 n, Kinangop, i.1930, xi.1930 (*Turner*) (7 ♂, 1 n in NMK; 3 ♂ in BMNH); 1 ♂, Kaimosi, iii–iv.1932 (NMK); 2 ♂, 3 ♀, Lake Baringo, Molo R. mouth, 17.vi.1934 (Rehn) (2 ♂, 2 ♀ in ANS, 1 ♀ in BMNH). **Uganda**: 1 ♂, Kagora Plains, vi.1911 (*Marshall*) (BMNH); 1 ♂, Kalinzu Forest, x.1948 (*Jackson*) (NMK); 2 ♂, Mpanga Forest, Fort Portal, ii.1957 (*Carcasson*) (NMK). **Rwanda**: 1 ♂, Rubengeri, 1911 (*Lestrade*); 1 ♂, Kisenyi, i.1954 (*Bertrand*). **Zaire**: 1 ♂, Katanga; 1 ♂, Haut Congo (IRSNB); 5 ♂, Kambove, ix.1906–iii.1907 (*Neave*) (1 in BMNH); 16 ♂, Bunkeya, x.1907 (*Neave*) (3 in BMNH); 2 ♂, Kambove to Chitura, xi.1907 (*Neave*); 1 ♂, xii.1907 (*Neave*); 1 ♂, Kasenyi, 19.vii.1911 (*Stappers*); 1 ♂, Kapiri, ix.1912 (*Miss. Agric.*); 3 ♂, 1 ♀, Katanga, Mwema, vii.1927 (*Bayet*) (1 ♂ in BMNH); 1 ♂, Ituri, Butembo, xii.1928 (*Van Riel*); 1 ♂, Semliki Plain, 900–1100 m, iv.–x.1937 (*Hackars*) (IRSNB); 1 ♂, Kunungu, 1941 (*N'Kele*); 1 ♂, Bas Congo, Lemfu, x.–xii.1944 (*Beir*); 1 ♂, Kivu, Kitwabalazi, 1946 (*Herrinck*); 1 ♂, Kindia, 2.v.1948 (*Olsen*) (ZL); 5 ♂, Katanga, Kundelungu, Affl. Lualaba II, L. Moero Basin, 1680 m, 17–19.x.1951 (*Leleup*) (2 in BMNH); 9 ♂, Garamba N.P., 30.xi.1951 (*De Saeger*) (3 in BMNH); 1 ♂, L. Albert, Mahagi Port, 16.ii.1954 (*Verbeke*) (IRSNB). **Somalia**: 1 ♂, Iscia Baidoa, 12–28.vi.1978 (MZSUS). **Malawi**: 1 ♂, 2 ♀, Namalindi, 12–14.xii.1969 (BMNH). **Cameroon**: 2 ♂, 6 ♀, M'Bakaou, iii.1967 (*Chemin*) (1 ♂, 2 ♀ in BMNH); 2 ♂, 1 ♀, Koum, 20–22.i.1976. (*Puylaert*). **Ethiopia**: 6 ♂, Zegi Tsana, v.–vi.1902 (*Degen*) (BMNH). **Nigeria**: 1 ♂, 2 ♀, Zaria, Samaru, 1979 (*Deeming*) (1 ♂, 1 ♀ in IAR; 1 ♀ in BMNH). **Togo**: 1 ♂, 3 ♀, Piya, 18–22.v.1963 (*Schach*) (1 ♀ in

BMNH). **Ghana**: 1 ♂, Gold Coast (*Woodward*) (BMNH). **Sierra Leone**: 2 ♂, 2 ♀, Rokupr, 1977 (BMNH). In MRAC unless otherwise stated.

DISTRIBUTION (Fig. 49). Africa south of the Sahara, and the Canary Islands. Holotype found in very wet soil.



Figs 9–21 Right male stridulatory file of (9) *Gryllotalpa rufescens*, (10) *G. devia*, (11) *G. bulla*, (12) *G. robusta*, (13) *G. debilis* (macropterous), (14) *G. debilis* (micropterous), (15) *G. africana*, (16) *G. pluridens*, (17) *G. spissidens*, (18) *G. elegans*, (19) *G. microptera*, (20) *G. brevilyra*, (21) *G. parva*.

Gryllotalpa rufescens Chopard

(Figs 9, 23, 37, 49, 52, 58)

Gryllotalpa rufescens Chopard, 1948: 110. LECTOTYPE ♂, ZAIRE (MRAC), here designated [examined].

DIAGNOSIS. ♂. Pronotum and legs rufous brown, colour 38 (Tawny) or 40 (Cinnamon-Rufous) in Naturalist's Colour Guide (Smithie, 1975). Pronotum very large compared with head. Venation of right male fore wing as in Fig. 23, radius sometimes divided distally into R_1 and R_s, sometimes undivided. Stridulatory teeth of right male fore wing as in Fig. 9, with 38–68 teeth (mean of 12 examined: 51·1) more widely spaced in centre of file than at ends, overall density 9·2–18·9 per mm (mean of 12 examined: 13·1). Hind tibiae armed above with 4–5 spines on internal margin. Song as in Figs 52, 58, a continuous trill consisting of repeated echemes of three syllables; mean syllable repetition rate 80·0–100·0/s, mean echeme repetition rate 15·9–17·6/s, mean carrier frequency 2·7–2·8 kHz (based on two recordings). Genitalia similar to *robusta* (Figs 5, 6).

♀. As male except for song and genitalia, and fore wings as in Fig. 37, long, often reaching tip of abdomen, venation variable, radius sometimes divided distally into R_1 and R_s, sometimes undivided, sometimes joined with *Sc*.

MEASUREMENTS

	Males	Females
Body length	(10): 25·3–32·9, mean 29·4	(4): 26·1–31·2, mean 29·0
Median length of pronotum	(12): 9·8–12·0, mean 10·7	(4): 9·6–11·2, mean 10·2
Length of hind femur	(10): 8·4–10·6, mean 9·6	(4): 9·0–10·2, mean 9·6
Length of fore wing	(12): 12·7–15·2, mean 14·0	(4): 14·5–16·6, mean 15·6
Length of stridulatory area	(12): 5·0– 6·8, mean 5·6	
Width of stridulatory area	(12): 2·9– 4·0, mean 3·2	
Length of stridulatory file	(12): 3·2– 5·1, mean 3·9	

DISCUSSION. This species is similar to *devia*, from which it may be distinguished by the presence of spines on the dorsal surface of the hind tibiae. The song is unusual in having the syllables grouped in threes (Fig. 52).

MATERIAL EXAMINED

Lectotype ♂, **Zaire**: Kunungu, 1937 (*Nkele for Schouteden*) (MRAC).

Zaire: 1 ♂, Mongbwalu, Kilo, 1930 (*Milliau*); 1 ♂, Rutshuru, xi.1937 (*Ghesquière*); 1 ♀ (paralectotype), Mongbwalu, Kilo, vii.1938 (*Scheitz*); 1 n, Bambesa, 10.ii.1939 (*Vrydagh*); 1 ♂, Kivu, Matale, 12.v.1949 (*Marlier*); 1 ♀, Bunyakiri 1800 m, 5–7.vi.1949 (*Laurent*) (all in MRAC). **Cameroon**: 1 ♂, Metet, ii.1922 (*Lippert*); 2 ♂, Lolodorf, iv.1925, 18.xii.1926 (*Good*) (all in ANS); 1 ♂, D'Ja Posten, 1–30.vii.1936 (*Merfield*). **Uganda**: 1 ♂, near Kisoro, Busanza, 13.xii.1970 (*Bailey*); 3 ♂, 3 ♀, Kigezi, Kinanira, 22.xi.1973 (Ngirumwe) (all in BMNH).

DISTRIBUTION (Fig. 49). Strictly equatorial, in moist woodland and rainforest of central Africa.

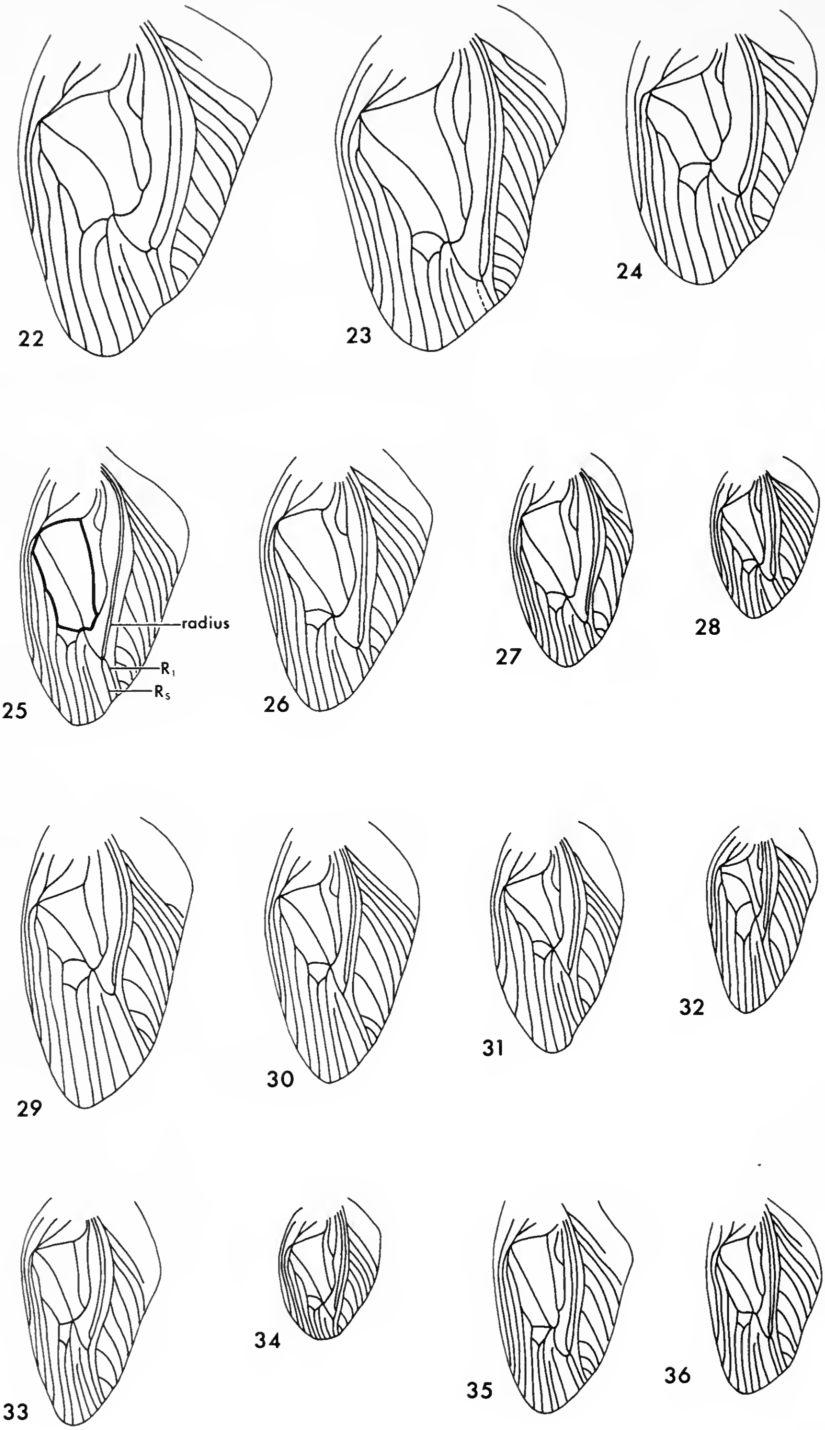
The *parva*-group

Gryllotalpa brevilyra sp. n.

(Figs 20, 32, 45, 51)

♂. Fairly uniform in colour, light to dark brown, veins of fore wings a little darker. Pronotum not unusually large compared with head. Lobes of mesonotum not exposed, concealed by pronotum and base of fore wings, never enlarged. Right fore wing as in Fig. 32; stridulatory area small, particularly posterior cell; R_1 and R_s fused; stridulatory file of right fore wing as in Fig. 20, with 51–94 teeth (mean of 50 examined: 66·6), fairly evenly spaced, 36·1–54·2 per mm (mean of 50 examined: 41·4). Hind wings long, extending well beyond tip of abdomen. Hind tibiae armed above with 3–4 spines on internal margin. Genitalia small, with short ventral processes.

♀. Right fore wing as in Fig. 45, R_1 and R_s fused.



Figs 22–36 Right male fore wing of (22) *Gryllotalpa devia*, (23) *G. rufescens*, (24) *G. bulla*, (25) *G. africana*, showing position of radius, R_1 and R_s, and boundary of stridulatory area, (26) *G. robusta*, (27) *G. debilis* (macropterous), (28) *G. debilis* (micropterous), (29) *G. pluridens*, (30) *G. spissidens*, (31) *G. elegans*, (32) *G. brevilyra*, (33) *G. parva*, (34) *G. microptera*, (35) *G. orientalis*, (36) *G. minuta*.

MEASUREMENTS

	Males	Females
Body length	(50): 17·4–27·2, mean 22·7	(36): 17·6–30·1, mean 23·7
Median length of pronotum	(50): 5·7– 8·0, mean 7·1	(37): 5·4– 8·6, mean 6·8
Length of hind femur	(50): 5·8– 8·2, mean 7·0	(36): 5·7– 8·2, mean 6·9
Length of fore wing	(50): 7·5–11·0, mean 9·2	(37): 8·0–11·7, mean 9·6
Length of stridulatory area	(50): 2·3– 3·5, mean 2·9	
Width of stridulatory area	(50): 1·3– 1·9, mean 1·5	
Length of stridulatory file	(50): 1·2– 2·5, mean 1·6	

DISCUSSION. *G. brevilyra* may be identified by the characteristic shape of the male stridulatory area (Fig. 32). The male stridulatory file is somewhat intermediate between those of *elegans* and *parva*.

MATERIAL EXAMINED

Holotype ♂. **Nigeria**: Jos, 1968 (*Bot-Gwong*) (MRAC).

Paratypes. **Nigeria**: 2 ♂, 6 ♀, same data as holotype (1 ♂, 1 ♀ in BMNH); 2 ♂, Zaria, Samaru, 1979 (*Deeming*) (1 in IAR; 1 in BMNH). **Zaire**: 1 ♂, 1 ♀, Wenga Ifomi (*Quineaux*) (1 ♀ in IRSNB, 1 ♂ in BMNH); 1 ♂, Haut Congo (IRSNB); 1 ♂, Kwango (IRSNB); 1 ♂, Kabinda (*Muller*) (IRSNB); 1 ♂, Kikwit (*de Caters*) (IRSNB); 1 ♂, Camp Lukula, 1911 (*Daniel*); 1 ♂, Mobwasa, ix.1911 (*Giorgi*); 1 ♀, Eala, iii.1917 (*Mayne*); 2 ♂, Kikwit, 1920 (*Vanderijst*) (1 in BMNH); 1 ♂, Haut-Uelé, Moto, 1920 (*Burgeon*); 1 ♂, 1 ♀, Kisantu, 1927 (*Vanderijst*) (1 ♀ in BMNH); 2 ♂, Kisangani ('Stanleyville'), xi.1929, 1949 (*Collart, Miller*); 6 ♂, Kasai, Tshikapa, 1930 (*Fourche*) (3 in BMNH); 1 ♂, Sankuru, Komi, v.1930 (*Ghesquière*); 1 ♂, Kinshasa ('Leopoldville'), 31.viii.1930 (*de Witte*); 1 ♂, Katanga, Kakyelo, 1–9.xi.1930 (*de Witte*); 1 ♂, Kunungu, 1932 (*Nkele for Schouteden*); 1 ♂, Lomami, Kaniama, iii.–iv.1932 (*Massart*); 2 ♂, 7 ♀, Eala, v.1921, 4.xi.1930, iv.1932, 17.iv.1932, 30.viii.1933, i.1935, ix.1935, xi.1936 (*Ghesquière, Bredo, Corbisier*) (2 ♀ in BMNH); 1 ♀, Lualua, Kapanga, 1934 (*Overlaet*); 1 ♂, Katanga, Tshipama, 1936 (*Drion*); 1 ♂, Mpese, 21–26.ix.1936 (*Cooreman*) (IRSNB); 1 ♂, Kunungu, 1938 (*Nkele for Schouteden*); 1 ♀, Lubunday, Albertville, 25.vii.1938 (*Pojer*) (IRSNB); 1 ♂, N. Rosso Norma, Lake Tumba, 31.vii.1938 (*Loreux*) (IRSNB); 1 ♂, Katanga, Mukabe to Kasavi, 1939 (*De Donckere*); 1 ♂, Lokandu, iii.1939 (*Maree*); 1 ♂, Mongbwalu, v.1939 (*Lepersonne*); 1 ♂, Lubunday, Albertville, 2.vii.1939 (*Pojer*) (IRSNB, Brussels); 1 ♂, Lisala, ix.–x.1939 (*Leontovitch*); 3 ♂, Mayidi, 1942, 1945 (*Van Eyen*); 5 ♂, Lemfu, x.–xii.1945, xii.1945 (*De Beir*); 1 ♂, Tshuapua, Flandria, 1946 (*Hulstaert*); 13 ♂, 18 ♀, 1 n, Upemba N.P., various localities, 4–24.xi.1947, 6.ix–16.x.1948, 10.vi.–7.vii.1949 (*de Witte*) (3 ♂, 6 ♀ in BMNH); 1 ♂, Titule, ix.–x.1949 (*Verbeke*) (IRSNB); 1 ♂, 1 ♀, Gandajika, 27.xi.1950 (*de Francquen*)1 ♂, 1 ♀, Maniema, Mobanga, 1952 (*Henrard*); 4 ♂, 12 ♀, Bokuma, i.–ii.1952, ii.1952, iii.1952, iv.1952, vii.1952, 1953, 1954, 1955 (*Lootens*) (1 ♂ in BMNH) 1 ♂, 2 ♀, Kalina, Kinshasa ('Leopoldville'), 1952 (*Theunissen*); 2 ♂, Lake Tanganyika, Albertville, 14.viii.1953 (*Verbeke*) (IRSNB; BMNH); 1 ♂, Bokalakala, Bolobo, 1954 (*Eloy*); 1 ♂, Albert N.P., Ruwenzori Mts., Kombo, 1550 m, 19.vii.1954 (*Vanschuytbroeck & Synave*); 1 ♂, Albertville, xi.1954 (*Bomans*); 1 ♀, Bokuma, 1955 (*Lootens*); 1 ♂, Tshuapua, Ikela, 1955 (*Lootens*); 1 ♂, Mt. Hoyo, near Kivu, iv.–v.1955 (*Hostie*) (IRSNB); 1 ♂, Sankuru, Djeka, 1955–1956 (*Roiseaux*); 1 ♂, Katanga, Busumba, viii.–ix.1957 (*de Caters*); 1 ♂, Kasongo, ix.1959 (*Benoit*). **Tanzania**: 1 ♂, L. Malawi, Mbamba Bay, 12–16.iv.1936 (*Zerny*) (NM). **Zimbabwe**: 1 ♂, Balla Balla, 30.xi.1913 (*Jones*) (BMNH). In MRAC unless otherwise stated.

DISTRIBUTION (Fig. 51). This species occurs mainly in the central African rainforest, spreading west as far as Nigeria, east to Lake Victoria, and south into Zambia. The record for Zimbabwe is based on a single male in the BMNH, and is in need of confirmation.

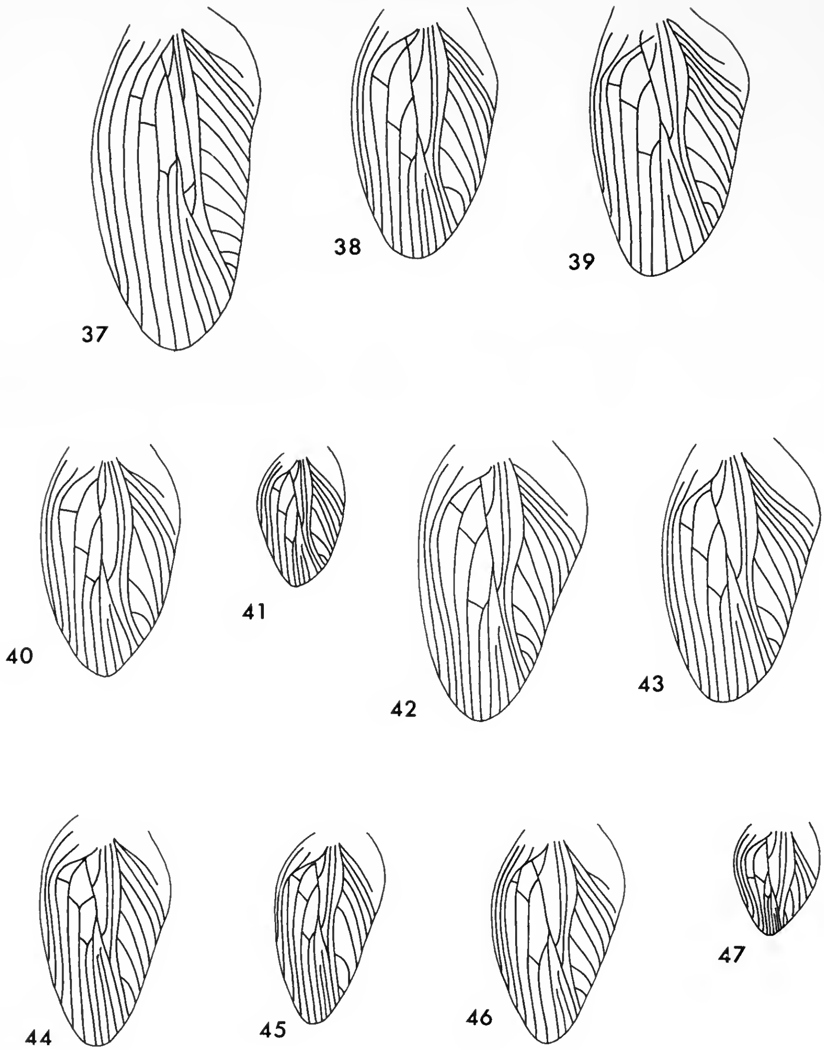
Gryllotalpa elegans Chopard

(Figs 18, 31, 44, 50)

Gryllotalpa elegans Chopard, 1934: 14. LECTOTYPE ♂, ZAIRE (MRAC), here designated [examined].

DIAGNOSIS. ♂. Venation of right fore wing as in Fig. 31, main veins unusually prominent, cross-veins indistinct or absent; R_1 and R_s fused; stridulatory area somewhat triangular, narrowing posteriorly. Stridulatory file of right fore wing as in Fig. 18, with 44–74 teeth (mean of 22 examined: 59·2) fairly evenly spaced, 23·5–31·0 per mm (mean of 22 examined: 27·2).

♀. Venation of right fore wing as in Fig. 44, main veins unusually prominent, cross-veins indistinct or absent; R_1 and R_s fused.



Figs 37–47 Right female fore wing of (37) *Gryllotalpa rufescens*, (38) *G. africana*, (39) *G. robusta*, (40) *G. debilis* (macropterous), (41) *G. debilis* (micropterous), *(42) G. pluridens*, (43) *G. spissidens*, (44) *G. elegans*, (45) *G. brevilyra*, (46) *G. parva*, (47) *G. microptera*.

MEASUREMENTS

	Males	Females
Body length	(17): 19·3–28·5, mean 23·1	(11): 21·7–27·8, mean 23·9
Median length of pronotum	(17): 6·5– 8·5, mean 7·3	(11): 6·9– 8·3, mean 7·5
Length of hind femur	(17): 6·1– 7·7, mean 6·9	(11): 6·7– 7·9, mean 7·2
Length of fore wing	(17): 8·0–10·8, mean 9·6	(11): 8·0–11·1, mean 9·7
Length of stridulatory area	(17): 2·8– 3·5, mean 3·2	
Width of stridulatory area	(17): 1·4– 1·9, mean 1·7	
Length of stridulatory file	(22): 1·6– 2·7, mean 2·2	

DISCUSSION. This distinctive species is recognisable by its prominent fore wing veins. The shape of the stridulatory area is rather similar to that of *spissidens*, but its fewer, less densely arranged

stridulatory teeth distinguish it from that species. The distribution of *spissidens* is quite different (see below).

MATERIAL EXAMINED

Lectotype ♂, **Zaire**: Bas-Congo, Yumbi, 1.x.1929 (*Bredo*)

Zaire: 1 ♀ (paralectotype) same data as lectotype; 1 ♀, L. Leopold II (*Hollebeke*); 2 ♂, Kinshasa, 13.x.1896 (*Waelbroeck*) (IRSNB); 1 ♀, Congo R., Mongala, 22.xii.1919 (*Tinant*); 1 ♀, Luebo to Luluabourg, 1921 (*Ghesquière*); 2 ♂, Bas-Congo, Yumbi, 1.x.1929 (*Bredo, Fini*) (1 in BMNH); 1 ♂, Eala, xi.1934 (*Ghesquière*); 1 ♀, Kunungu, 1941 (*N'Kele*); 1 ♂, Kalina, 12.xi.1942 (*Fiasse*); 3 ♂, 3 ♀, Kinshasa ('Léopoldville'), 1942, i.1947, ii.1947, 20–30.ix.1950, 15.xii.1950 (*Fiasse, Dartevelle, Jobels*) (1 ♂ in BMNH); 2 ♂, Boma, 19.xi.1952 (*Basilewsky*) (1 in BMNH); 1 ♀, Bokuma, i.–ii.1952 (*Lootens*) (BMNH); 1 ♀, Kasai, Djeka, 1954 (*Roiseaux*); 1 ♂, Ishango, vii.1954 (*Semliki*) (IRSNB); 30 ♂, 26 ♀, Tshuapua, Bamanya, x.1951, 1952, x.1952, i.1955, 1960, x.1961, xii.1961, 1968 (*Hulstaert, Sibbens-Pollet*); (4 ♂, 5 ♀, in BMNH); 1 ♂, Tshuapua, Boende, 1960 (*Sibbens-Pollet*). In MRAC unless otherwise stated.

DISTRIBUTION (Fig. 50). Restricted to the basin of the Congo River and its tributaries. In the coastal rainforest of West Africa and Cameroon it is replaced by *spissidens*.

Gryllotalpa microptera Chopard

(Figs 19, 34, 47, 51)

Gryllotalpa microptera Chopard, 1939: 6. LECTOTYPE ♂, ZAIRE (MRAC), here designated [examined].

DIAGNOSIS. ♂. Fore wings much shorter than abdomen, sometimes not extending beyond second abdominal segment in larger specimens, occasionally reaching fifth or sixth segment in smaller ones; venation of right fore wing as in Fig. 34, R_1 and R_s fused; stridulatory area somewhat triangular. Stridulatory file of right fore wing as in Fig. 19, with 40–60 teeth (mean of 20 examined: 52·5), fairly evenly spaced, 26.7–47.5 per mm (mean of 20 examined: 34·0). Hind wings vestigial, usually shorter than fore wings, sometimes a little longer.

♀. Fore wings sometimes a little longer than those of males; venation of right fore wing as in Fig. 47, R_1 and R_s fused.

MEASUREMENTS

	Males	Females
Body length	(27): 15·6–29·0, mean 20·6	(24): 15·7–29·6, mean 21·1
Median length of pronotum	(27): 5·2– 8·6, mean 7·0	(24): 5·0– 9·2, mean 7·2
Length of hind femur	(27): 5·0– 7·7, mean 6·2	(24): 5·0– 8·1, mean 6·4
Length of fore wing	(27): 3·3– 6·8, mean 4·8	(24): 3·6– 6·8, mean 5·3
Length of stridulatory area	(24): 1·8– 3·0, mean 2·4	
Width of stridulatory area	(24): 1·0– 1·7, mean 1·4	
Length of stridulatory file	(20): 1·0– 2·1, mean 1·6	

DISCUSSION. *G. microptera* is the only known Afrotropical *Gryllotalpa* which is invariably micropterous. Superficially it resembles the micropterous form of *debilis*, but differs from it in having fewer, more evenly spaced stridulatory teeth (Figs 14, 19), and in the radius being undivided.

MATERIAL EXAMINED

Lectotype ♂, **Zaire**: Rutshuru, 13.vi.1934 (*de Witte*) (MRAC).

Zaire: 2 ♀, Rutshuru, 26.xi.–16.xii.1933, 17–25.xii.1933 (*de Witte*) (IRSNB); 1 ♀, Lac Mugunga, 25.i.–3.ii.1933 (*de Witte*) (IRSNB); 3 ♂, 2 ♀, Lac Mugunga, 25.i.1934 (*de Witte*) (MRAC); 1 ♀, Bulengo, 29.i.1934 (*de Witte*) (MRAC) (all paralectotypes); 1 ♀, Katanga, Nyonga, v.1925 (*de Witte*); 1 ♂, Katanga, L. Kabamba, v.1927 (*Bayet*); 1 ♂, Katanga, Mwema, vii.1927 (*Bayet*); 1 n, L. Mugunga, 25.i.–3.ii.1933 (*de Witte*); 2 n, Rutshuru, 26.xi.–16.xii.1933, 26.xii.1933 (*de Witte*) (IRSNB); 2 n, L. Mugunga, 25.i.1934 (*de Witte*) (IRSNB); 1 ♂, 1 ♀, Niangara-Dungu, Ekibondo, R. Uelé, 28.ix.1934 (*Rehn*) (ANS); 1 ♂, Lisala, 6.x.1937 (*Leontovitch*); 2 ♂, 1 ♀, Rutshuru, x.1937 (*Ghesquière*) (1 ♂ in BMNH); 2 ♂, Lokandu, I. Biawa, vii.1939 (*Vissers*) (1 in BMNH); 1 ♀, Yangambi, 1940 (*I.N.E.A.C.*); 1 ♂, Bas-Congo, Mayidi, 1942 (*Van Eyen*); 2 ♂, 1 ♀, Upemba, N.P., Gorges de la Pelenge, 6–10.vi.1947 (*de Witte*) (1 ♂ in BMNH); 1 ♂, Upemba N.P., Kaswabilenga, 16.x.1947 (*de Witte*); 1 ♀, Upemba N.P., Kilwezi, R. Lufira, 9–14.viii.1948 (*de Witte*); 1 ♂, 2 ♀, Kivu, Matale, 8–14.v.1949 (*Laurent*) (1 ♀ in BMNH); 1 ♂, Kavuma-Costermansville, 16.vi.1949 (*Laurent*); 1 ♂, Costermansville-Nyagezi, 20.vi.1949

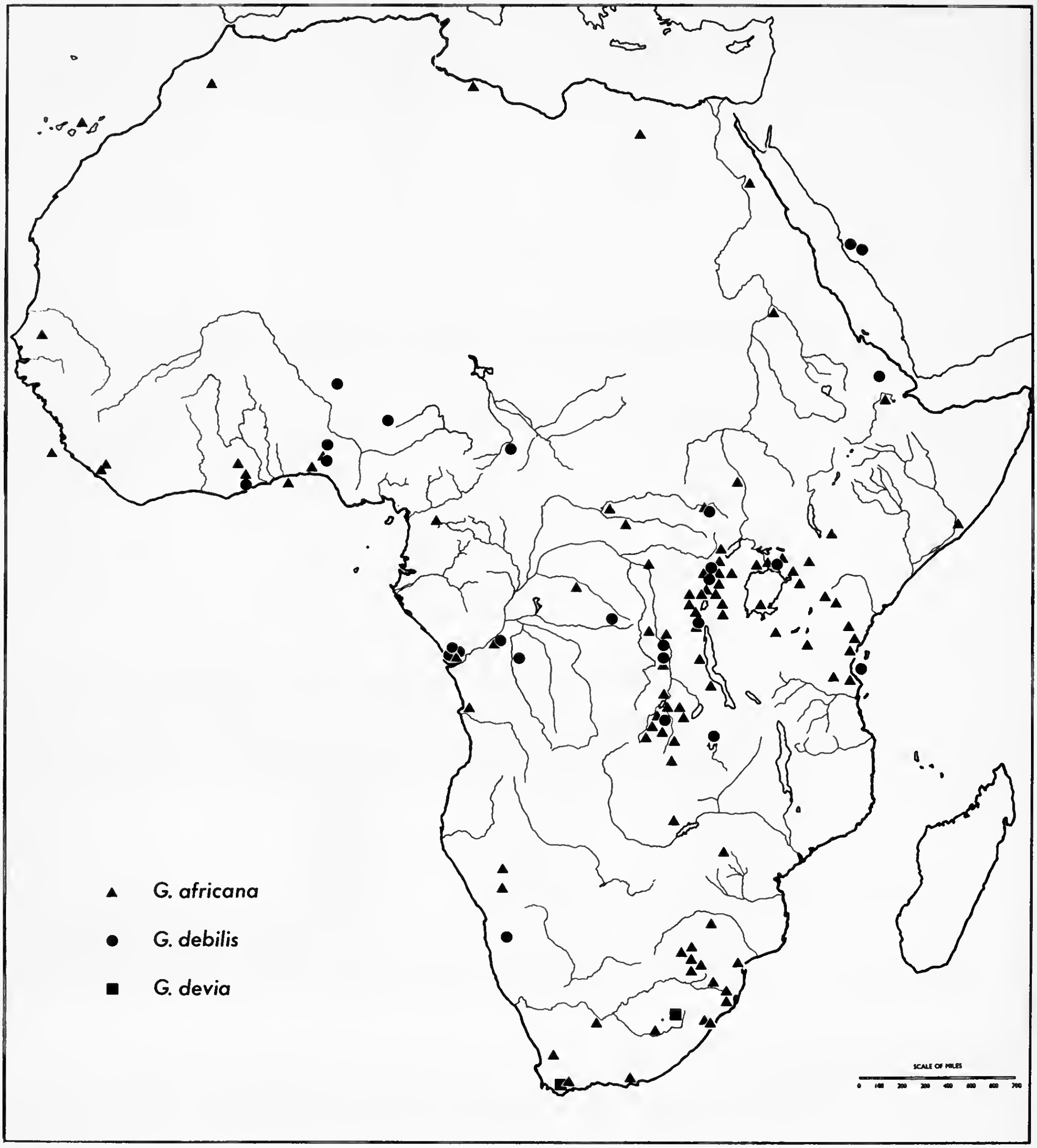


Fig. 48 Map of known distribution of *Gryllotalpa africana, G. debilis* and *G. devia.*

(*Laurent*); 1 ♀, Urundi, Kigwena, 780 m, 9.xii.1949 (*Laurent*); 1 ♂, Urundi, Kibaro, 1250 m, 15–19.xii.1949 (*Laurent*) (BMNH); 1 ♂, 1 ♀, Kivu, Kalehe Makwe, ii.1950 (*Bomans*); 9 ♂, 6 ♀, 1 n, Garamba N.P., 18.iv.1950, 30.viii.1950, 12.x.1950 (*De Saeger, Demoulin*) (2 ♂, 2 ♀ in BMNH); 1 ♀, Albert N.P., plaine Baulendu, Semliki, 21.ii.1951 (*de Wilde*); 1 ♀, Equateur, Bokuma, i.–ii.1952 (*Lootens*); 1 ♂, Albert N.P., Kibanda, Lume, 7.xii.1956 (*Vanschuytbroeck*); 1 ♂, Kivu, Uvira, Luvunyi, 5.xii.1961 (*Kiss*). **Kenya**: 1 ♀, Kakamega, xi.1976 (*Clifton*) (NMK). **Tanzania**: 1 ♂ (*Lemaire*). **Rwanda**: 3 ♀, Nyangwe, viii.–ix.1946 (*Scholl*). In MRAC unless otherwise stated.

DISTRIBUTION (Fig. 51). Equatorial Africa.

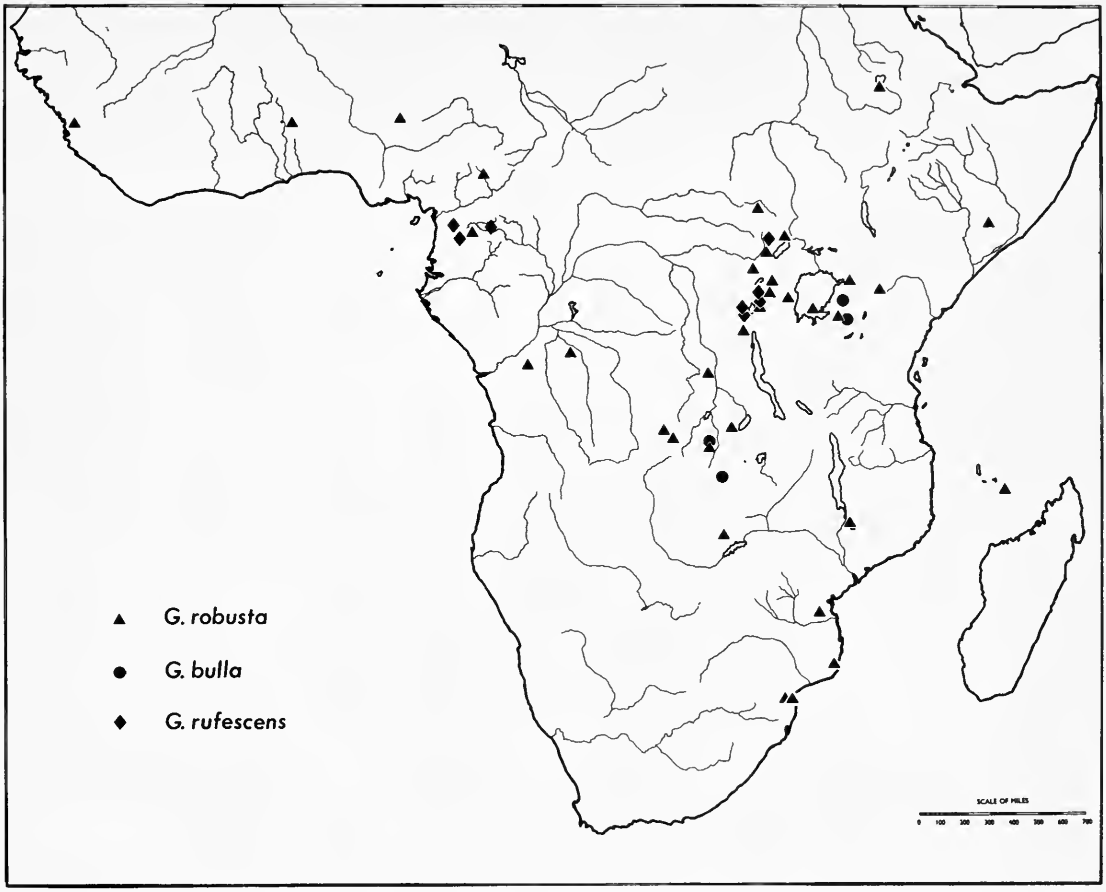


Fig. 49 Map of known distribution of *Gryllotalpa robusta, G. bulla* and *G. rufescens*.

Gryllotalpa parva sp. n.

(Figs 21, 33, 46, 50, 56, 62)

♂. Fairly uniform in colour, usually fairly light brown, veins of fore wings a little darker. Pronotum not unusually large compared with head. Lobes of metanotum not exposed, concealed by pronotum and base of fore wings, never enlarged. Right fore wing as in Fig. 33; stridulatory area fairly rectangular; R_1 and R_s fused. Stridulatory file of right fore wing as in Fig. 21, with 40–70 teeth (mean of 41 examined: 55·5), fairly evenly spaced, 26·4–33·3 per mm (mean of 41 examined: 30·0). Hind wings long, extending well beyond tip of abdomen. Hind tibiae armed above with 2–4 spines on internal margin. Genitalia small, with short ventral processes. Song as in Figs 56, 62, a continuous trill; mean syllable repetition rate 76·4–81·4/s, mean carrier frequency 2·9–3·3 kHz (based on 2 recordings).

♀. Right fore wing as in Fig. 46, R_1 and R_s fused.

MEASUREMENTS

	Males	Females
Body length	(41): 19·3–26·0, mean 22·1	(50): 17·8–28·0, mean 22·5
Median length of pronotum	(41): 5·8– 7·7, mean 6·7	(50): 5·7– 8·3, mean 6·8
Length of hind femur	(41): 5·8– 7·7, mean 6·8	(50): 5·8– 8·5, mean 6·9
Length of fore wing	(41): 8·2–11·0, mean 9·3	(50): 7·6–12·0, mean 9·6
Length of stridulatory area	(40): 3·0– 3·7, mean 3·4	
Width of stridulatory area	(40): 1·5– 2·1, mean 1·9	
Length of stridulatory file	(41): 1·3– 2·2, mean 1·9	

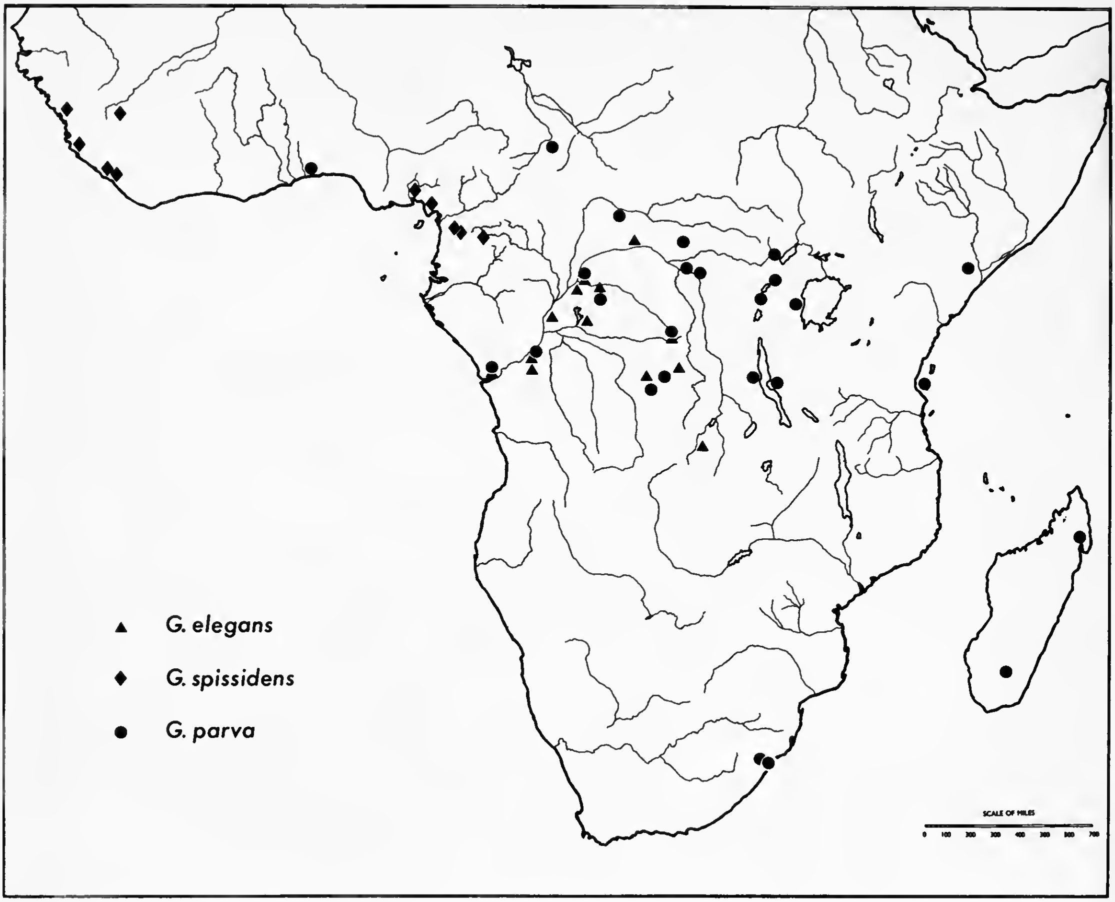


Fig. 50 Map of known distribution of *Gryllotalpa elegans, G. spissidens* and *G. parva*.

DISCUSSION. *G. parva* is most similar to *brevilyra*, from which it may be distinguished by the shape of the stridulatory area and the density of the stridulatory teeth of the males, although females are inseparable. *G. parva* has a characteristically rectangular stridulatory area, and lacks the prominent fore wing veins of *elegans*.

MATERIAL EXAMINED

Holotype ♂, **South Africa**: Natal, Eshowe, 30.x.1980 (*Otte*) (ANS).

Paratypes. **South Africa**: 1 ♂, 1 n, same data as holotype (ANS). **Tanzania**: 1 ♂, Lake Tanganyika (*Cunnington*) (BMNH); 1 ♂, Bukoba, xii.1921 (*Miller*) (BMNH); 1 ♂, Mahagi Peninsula, Kasoge, 2550 feet, viii.–ix.1959 (*Oxford University Expedition*) (BMNH). **Zaire**: 1 ♂, Kasai, Lukenge (*Fontainas*) (MRAC); 1 ♂, Ed. Luja, Kondué (BMNH); 1 ♂, Sankuru, Beni Bendi (*Cloetens*); 1 ♂, 1 ♀, Bohor; 1 ♂, Kinshasa ('Leopoldville') (*Wilverth*); 1 ♂, Mayumbe, 3.xi.1912 (*Verschueren*) (MRAC); 1 ♂, 2 ♀, Boma, 28.iii.1913, 5.vii.1920 (*Styczynski, Schouteden*) (MRAC); 2 ♂, Kisangani ('Stanleyville'), xii.1929 (*Muller*); 1 ♂, Kisangani ('Stanleyville'), 6.vii.1932 (*Vrydagh*) (MRAC); 1 ♂, 2 ♀, 1 n, Lulua, Kapanga, iii.1933 (*Overlaet*) (1 ♂, 1 ♀, 1 n in MRAC; 1 ♀ in BMNH); 1 ♂, Haute Tshuapua, Skela, 1936 (*Buckinckx*) (MRAC); 1 ♂, Buta, 1939 (*Vanbreuscghem*) (MRAC); 1 ♂, Sankuru, Bakwanga, 5.vi.1939 (*Bequaert*) (MRAC); 1 ♂, Yangambi to Yakusu, 12.iii.1940 (MRAC); 1 ♂, Kisangani ('Stanleyville'), 5.v.1948 (ZL); 1 ♂, Tshuapua, Imbonga, xii.1952 (*Lootens*) (MRAC); 2 ♂, 1 ♀, Ubangi, Bumba, ii.–xii.1952 (*Basilewsky*) (1 ♂, 1 ♀ in MRAC; 1 ♂ in BMNH); 1 ♂, 3 ♀, Lake Tanganyika, Albertville, 14.viii.1953 (*Verbeke*) (1 ♀ in BMNH); 6 ♂, 20 ♀, Vitshumbi, i.1953, 31.iii.1953, x.1953 (*Verbeke*) (1 ♂, 4 ♀ in BMNH); 10 ♂, 31 ♀, Kasenyi, vi.1953, 11.xii.1953, 13.xii.1953, 15.xii.1953 (*Verbeke*) (3 ♂, 7 ♀ in

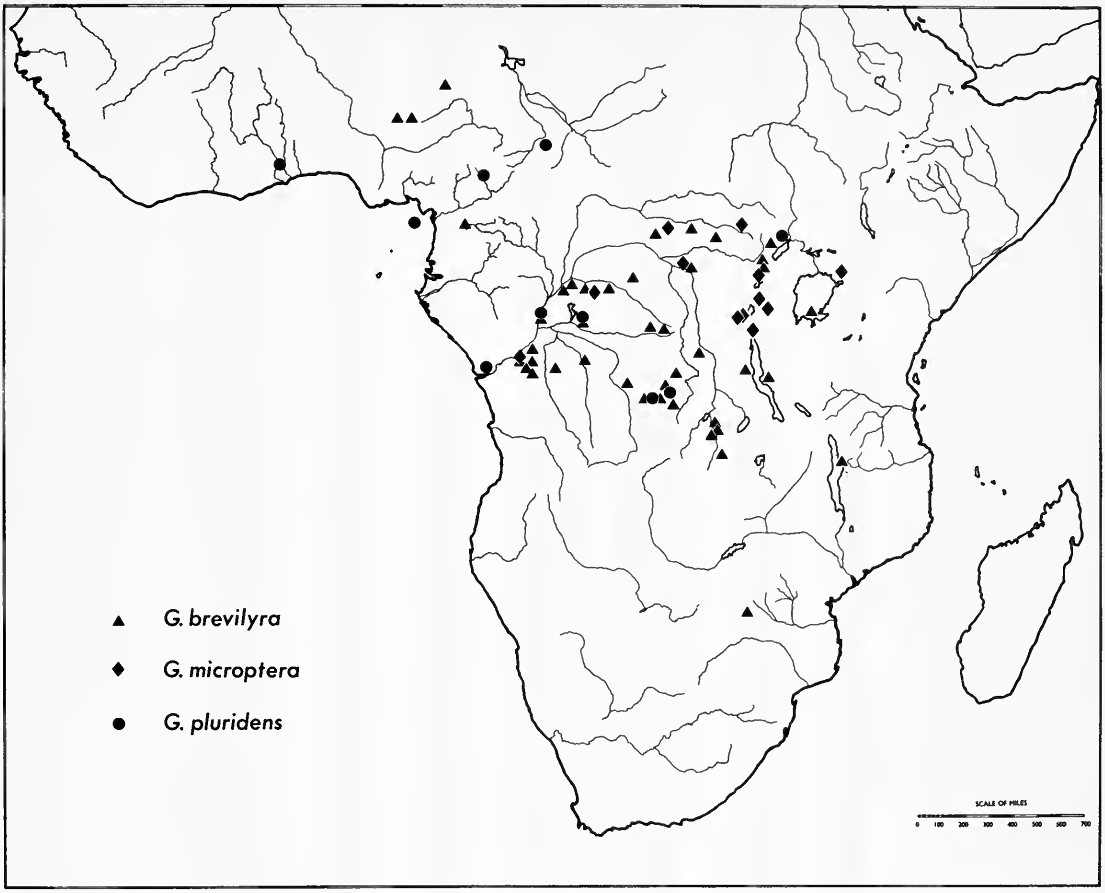


Fig. 51 Map of known distribution of *Gryllotalpa brevilyra, G. microptera* and *G. pluridens*.

BMNH); 1 ♂, Lake Albert, Ituri Sabe, 16.xii.1953 (*Verbeke*); 1 ♂, 5 ♀♀, Bezaka, 19.xii.1953 (*Verbeke*) (1 ♀ in BMNH); 2 ♂, Tshuapua Bamanya, vi.1954, iv.1961 (*Hulstaert*) (MRAC); 5 ♂, 12 ♀, Ishango, viii.1954 (*Semliki*) (1 ♂, 3 ♀ in BMNH); 4 ♂, 1 ♀, Sankuru, Djeka, 1955–1956 (*Roiseaux*) (3 ♂, 1 ♀ in MRAC; 1 ♂ in BMNH). **Somalia**: 1 ♂, Afmadu, 20–24.viii.1970 (MZSUS). **Ethiopia**: 1 ♂, Lake Hora Harsadi, Addas, c. 7000 ft, 4.xii.1926 (*Scott*) (BMNH). **Benin**: 1 ♂, 1 ♀, Cotonow (MHN). In IRSNB unless otherwise stated.

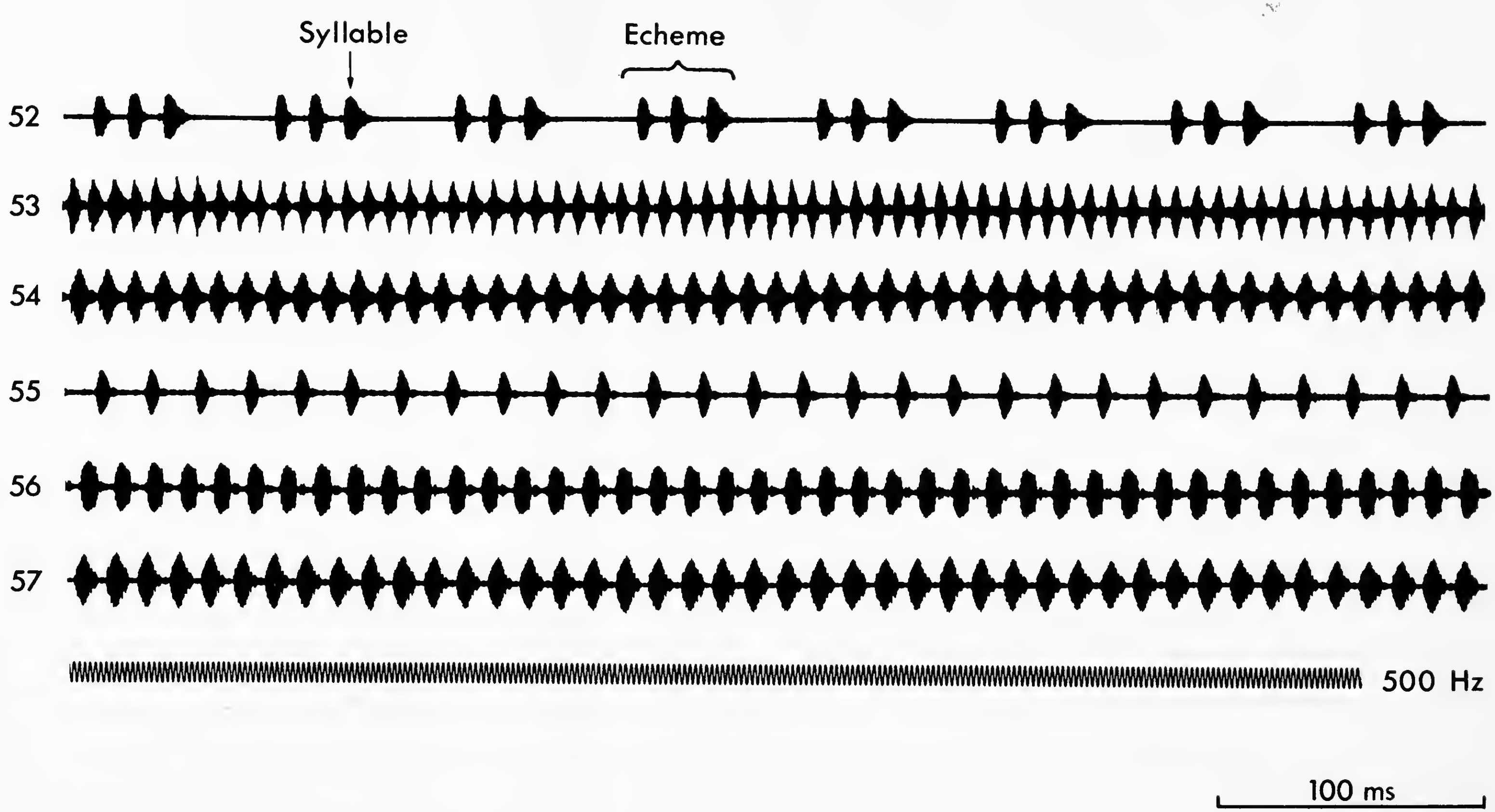
DISTRIBUTION (Fig. 50). Equatorial and southern Africa, also Madagascar. *G. parva* is the only member of the *parva*-group which occurs south of the Southern Tropic.

Gryllotalpa pluridens sp. n.

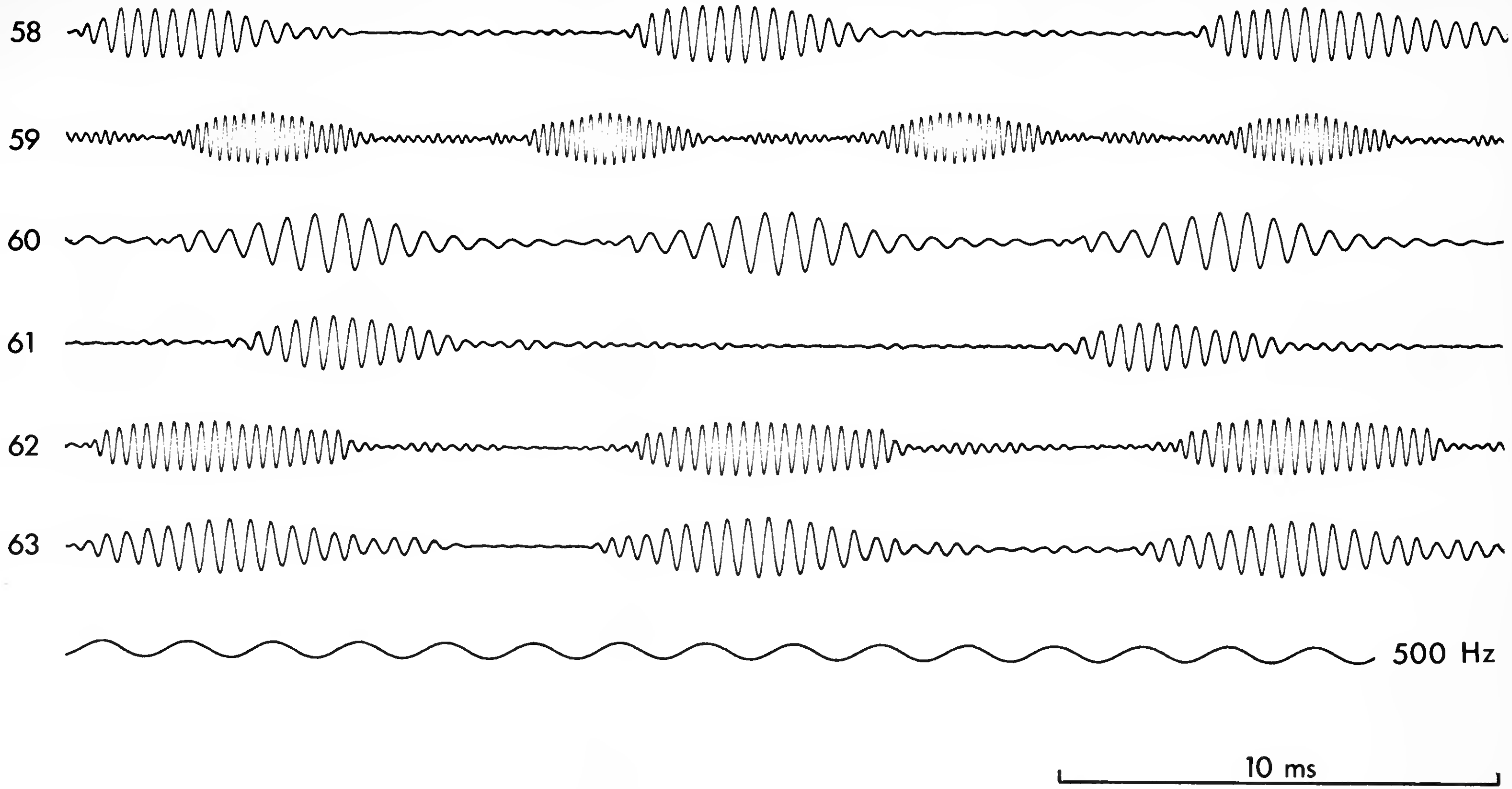
(Figs 16, 29, 42, 51)

♂. Usually fairly uniform in colour, sandy yellow to dark brown, veins of fore wings a little darker, head dark even in lighter specimens. Pronotum not unusually large compared with head. Lobes of mesonotum not exposed, concealed by pronotum and base of fore wings, never enlarged. Right fore wing as in Fig. 29; stridulatory area rather square, sometimes narrowing posteriorly; R_1 and R_s fused. Stridulatory file of right fore wing as in Fig. 16, with 76–107 teeth (mean of 23 examined: 98·0) fairly evenly spaced, 30·4–43·3 per mm (mean of 23 examined: 35·8). Hind wings long, extending well beyond tip of abdomen. Hind tibiae armed above with 3–4 spines on internal margin. Genitalia small, with short ventral processes.

♀. Right fore wing as in Fig. 42, R_1 and R_s normally fused; if separated, then R_1 generally rather faint.



Figs 52–57 Oscillograms of the songs of (52) *Gryllotalpa rufescens*, (53) *G. bulla*, (54) *G. robusta*, (55) *G. africana*, (56) *G. parva*, (57) *G. orientalis*, showing differences in syllable repetition rate and rhythmic pattern.



Figs 58–63 Oscillograms of the songs of (58) *Gryllotalpa rufescens*, (59) *G. bulla*, (60) *G. robusta*, (61) *G. africana*, (62) *G. parva*, (63) *G. orientalis*, showing differences in carrier frequency.

MEASUREMENTS

	Males	Females
Body length	(24): 24·0–34·6, mean 28·4	(13): 21·5–32·9, mean 28·9
Median length of pronotum	(24): 7·8–10·2, mean 9·2	(13): 8·0– 9·3, mean 8·8
Length of hind femur	(23): 7·6–10·1, mean 8·8	(13): 7·9–10·3, mean 8·9
Length of fore wing	(24): 10·5–14·2, mean 12·0	(13): 10·7–13·3, mean 12·0
Length of stridulatory area	(21): 3·2– 4·4, mean 3·9	
Width of stridulatory area	(21): 2·1– 3·0, mean 2·4	
Length of stridulatory file	(23): 2·4– 3·2, mean 2·7	

DISCUSSION. The venation of the fore wing, arrangement of stridulatory teeth, and width of the stridulatory area distinguish males of *pluridens* from all other species except *spissidens*. They differ from this species principally in the overall shape of the stridulatory area, which is much squarer in *pluridens*, and in never having unusually prominent veins. Females of *pluridens* and *spissidens* are inseparable from each other, and cannot be distinguished reliably from those of the *africana*-group.

MATERIAL EXAMINED

Holotype ♂, **Chad**: Bebedjia, xi.1965 (*Schmitz*) (MRAC).

Paratypes. **Chad**: 4 ♂, 6 ♀, same data as holotype (2 ♂♂, 2 ♀♀ in BMNH); **Ghana**: 1 ♂, 3 ♀, Trans-Volta-Togoland, Kpandu, 23.xii.1959, 28.xii.1959, 3.i.1960 (*Jago*) (BMNH). **Cameroon**: 3 ♂, M'Bakaou, iii.1971 (*Chemin*) (1 in BMNH). **Zaire**: 1 ♂, Mayumbe, Luki (*Englebert*) (IRSNB); 1 ♂, Katomoja (*Lemaire*); 1 ♂, Eala, 2.ii.1923 (*Oye*) (BMNH); 1 ♂, Kibali-Ituri, Mahagi, 1934 (*Scops*); 1 ♀, Eala, xi.1934 (*Ghesquière*); 1 ♂, Lulua, Luashi, 1936 (*Faiyne*); 1 ♂, 1 ♀, Upemba N.P., Masombwe R., Kanakakazi, 1120 m, 4–16.x.1948 (*de Witte*) (♀ in BMNH); 1 ♂, Garamba N.P., Akam, 13.xii.1949 (*Demoulin*); 3 ♂, 2 ♀, Garamba N.P., 2.i.1950, 23.i.1950, 3.v.1950, 27.ix.1950 (*De Saeger, Demoulin*) (2 ♂ in BMNH); 1 ♂, 1 ♀, near Bolobo, Dwa, 1950, xii.1951 (*N'Gwe*); 1 ♂, L. Léopold II, Bokoro, 1952 (*Jans*); 1 ♂, 1 ♀, Mayumbe, T. Kipanzu, Singa to Mbomba, v.–vi.1958 (*Laurent*); 1 ♂, Mayumbe, Kitadi, viii.1958 (*Laurent*); 1 ♂, Buie, 27.iii.–5.iv.1975 (*s.b.z.*) (BMNH) **Bioko** (Fernando Poo): 1 ♂, 2 ♀ (*Nicholls*) (BMNH). In MRAC unless otherwise stated.

DISTRIBUTION (Fig. 51). Central Africa, its range overlapping that of *spissidens* from Ghana to Cameroon.

Gryllotalpa spissidens sp. n.

(Figs 17, 30, 43, 50)

♂. Fairly uniform in colour, light to dark brown, veins of fore wings a little darker. Pronotum not unusually large compared with head. Lobes of mesonotum not exposed, concealed by pronotum and base of fore wings, never enlarged. Right fore wing as in Fig. 30; stridulatory area rectangular; R_1 and R_s fused. Stridulatory file of right fore wing as in Fig. 17, with 72–96 teeth (mean of 19 examined: 85·9), fairly evenly spaced, 33·5–45·2 per mm (mean of 19 examined: 39·3). Hind wings long, extending well beyond tip of abdomen. Hind tibiae armed above with 3–4 spines on internal margin. Genitalia small, with short ventral processes.

♀. Right fore wing as in Fig. 43, R_1 and R_s normally fused; if separated, then R_1 generally rather faint.

MEASUREMENTS

	Males	Females
Body length	(19): 23·0–31·0, mean 27·8	(23): 23·6–31·8, mean 28·4
Median length of pronotum	(19): 7·6– 9·5, mean 8·6	(23): 7·0– 9·2, mean 8·3
Length of hind femur	(18): 7·2– 8·7, mean 8·2	(21): 7·5– 9·0, mean 8·2
Length of fore wing	(19): 9·2–11·8, mean 10·6	(23): 9·8–12·8, mean 11·0
Length of stridulatory area	(19): 3·4– 4·4, mean 3·9	
Width of stridulatory area	(19): 1·8– 2·2, mean 2·0	
Length of stridulatory file	(19): 1·9– 2·8, mean 2·2	

DISCUSSION. This species is very similar to *elegans*, from which it may be distinguished by its many, densely packed stridulatory teeth. Some specimens have rather prominent fore wing veins, with poorly marked cross-veins, as in *elegans*, but this feature is less pronounced in

spissidens. The distribution of *elegans* is quite different (see below). *G. spissidens* is also close to *pluridens*, differing in the shape of the stridulatory area (Figs 29, 30).

MATERIAL EXAMINED

Holotype ♂, **Cameroon**: Efulun, 10.ii.1923 (*Weber*) (ANS).

Paratypes. **Cameroon:** 1 ♂, 1 ♀, Bitye, Ja River, 3 ♂, 7 ♀, 2 n, Efulun, 25.ix.1920, 20.xi.1920, 22.xi.1920, 24.x.1922, 10.ii.1923, 10.iii.1923, 13.iii.1923, 18.iii.1923, 21.xi.1924 (*Weber*) (1 ♂, 1 ♀ in BMNH); 5 ♂, 7 ♀, Lolodorf, 2.iv.1920, 10.xii.1920, 16.ii.1921, ii.1921, 27.ix.1922, 2.ii.1923, x.1923, 2.ii.1924, 4.vii.1924, iii.1925 (*Good*) (2 ♂, 2 ♀ in BMNH); 1 ♂ (*Conrad*); 2 ♀, Harbel, 26.xii.1944, 1945–7 (*Fox, Beatty*); 1 ♂, 1 ♀, Victoria, 15.xi.1949 (*Oldroyd*) (BMNH). **Nigeria**: 1 ♂, Oban District (*Talbot*) (BMNH). **Liberia**: 1 ♂, Monrovia, 23.xi.1947 (*Olsen*) (ZL); 2 ♂, 5 ♀, Marshall Territory, 10.i.1955, 21.iv.1955, 12.v.1955, 27.v.1955, 2.xi.1955, 3.ii.1956, 7.i.1957 (*Fox*) (2 ♀ in BMNH). **Sierra Leone**: 1 ♂ (*Morgan*) (BMNH). **Guinea**: 5 ♀, near Serokoro ('Zérékoré'), 16.iii.–18.iv.1950 (*Olsen*) (4 in UZM; 1 in BMNH); 2 ♂, 8 ♀, Kindia, 1964–5 (*Dedycker*) (1 ♂, 7 ♀ in MRAC; 1 ♂, 1 ♀ in BMNH). In ANS unless otherwise stated.

DISTRIBUTION (Fig. 50). Restricted to the coastal rainforest of West Africa and the Cameroon, where it replaces *elegans*.

Acknowledgements

I thank the following who kindly lent type-material or other specimens from their respective institutions:

Dr P. Basilewsky, Mr M. P. Clifton, Mr J. Deeming, Drs M. Donskoff, M. Dorn, H. Enghoff, K. K. Günther, B. Hauser, A. J. Hesse, P. Johnsen, D. Otte, Mr M. J. Scoble, Drs G. Schmitz, P. Vanschuytbroeck, M. Vannini and S. Mascherini.

Mr D. Moyer, Sumbawanga Mission, Tanzania, sent me live specimens of *robusta*. Dr D. Otte generously made available to me tape recordings and specimens from his recent visit to South Africa. Dr W. J. Bailey kindly allowed me to use his tape recordings of *rufescens*, and presented them to the British Museum (Natural History). Prof. H. Strümpel provided information on the syntypes of *minor*.

I am also grateful to Mr W. J. Reynolds for providing song analyses from the tape recordings used, and to my wife for typing the manuscript.

References

Alexander, R. D. 1962. The role of behavioral study in cricket classification. *Systematic Zoology* **11**: 53–72.

Bennet-Clark, H. C. 1970. A new French mole cricket, differing in song and morphology from *Gryllotalpa gryllotalpa* L. (Orthoptera: Gryllotalpidae). *Proceedings of the Royal Entomological Society of London* (B) **39**: 125–132.

Broughton, W. B. 1964. Method in bio-acoustic terminology. *In* Busnel, R. G. (ed.), *Acoustic behaviour of animals*. xx+933 pp. Amsterdam, London, New York.

—— 1976. Proposal for a new term 'echeme' to replace 'chirp' in animal acoustics. *Physiological Entomology* **1**: 103–106.

Bruner, L. 1915. Preliminary catalogue of the Orthopteroid insects of the Philippine Islands. *The University Studies of the University of Nebraska* **15**: 195–281.

Brunn, M. von 1901. Ostafrikanisehe Orthopteren gesammelt von Herrn Dr. F. Stuhlmann 1888 und 1889. *Mitteilungen aus dem Naturhistorischen Museum in Hamburg* **18**: 213–283.

Burmeister, H. 1834–1839. *Handbüch der Entomologie* **2**. 1050 pp. Berlin.

Chopard, L. 1934. Catalogues raisonnés de la faune entomologique du Congo Belge. Orthoptères-Gryllides. *Annales du Musée du Congo Belge*, Zoologie (3) **4**: 1–88.

—— 1939. Gryllidae. *Exploration du Parc National Albert. Mission G. F. de Witte (1933–1935)* **27**: 5–15.

—— 1948. Contribution à l'étude des Gryllides du Congo Belge. *Revue de Zoologie et de Botanique Africaines* **41**: 109–121.

—— 1955. Orthoptera Ensifera et Tridactyloidea. *South African animal life. Results of the Lund University expedition in 1950–1951* **2**: 266–301.

—— 1967. Contribution à la faune du Congo (Brazzaville). Mission A. Villiers et A. Descarpentries. L. Orthoptères Gryllodea. *Bulletin de l'Institut Fondamental d'Afrique Noire* **29**(A): 758–776.

—— 1968. Gryllides. Fam. Gryllidae: subfam. Mogoplistinae, Myrmecophilinae, Scleropterinae, Cachoplistinae, Pteroplistinae, Pentacentrinae, Phalangopsinae, Trigonidiinae, Eneopterinae. Fam. Oecanthidae, Gryllotalpidae. *Orthopterorum Catalogus* **12**. pp. 215–500. s'Gravenhage.

—— 1969. Orthoptera, vol. 2, Grylloidea. *The fauna of India and the adjacent countries.* xviii+421 pp. Calcutta.

Fieber, F. X. 1851. Geschichte der Gesellschaft 1848, 1849, 1850. 10. Section für Naturwissenschaften und angewandte Mathematik am 23 November 1848. *Abhandlungen der Königlichen Böhmischen Gesellschaft der Wissenschaften* (5) **6**: 15–18.

Gerstaecker, A. 1869. Beitrag zur Insekten-fauna von Zanzibar. 11. Orthoptera et Neuroptera. *Archiv für Naturgeschichte* **35**: 202–223.

Karny, H. 1907. Die Orthopterenfauna des Kustengebietes von Österreich-Ungarn. *Berliner Entomologische Zeitschrift* **52**: 17–52.

Kirby, W. F. 1906. *A synonymic catalogue of Orthoptera* 2. Orthoptera Saltatoria 1. Achetidae et Phasgonuridae. vii+228 pp. London.

Latreille, P. A. 1802. *Histoire naturelle, générale et particulière, des Crustacées et des Insectes* **3**. 386 pp, 37 pls. Paris.

Leach, W. 1815. Entomology. *In* Brewster, D. (ed.), *The Edinburgh Encyclopedia* **9**. 766 pp. Edinburgh.

Lopez Seoane, V. 1878. Ortópteros de la peninsula Hispano-Lusitanica. *Stettiner Entomologische Zeitung* **39**: 366–376.

Matheny, E. L. 1981. Contrasting feeding habits of pest mole cricket species. *Journal of Economic Entomology* **74**: 444–445.

Mjöberg, E. 1913. Preliminary descriptions of some new, Australian Gryllids and Forficulids. *Entomologisk Tidskrift* **34**: 26–34.

Oken, L. 1815. *Lehrbuch der Naturgeschichte* **3**. Zoologie 1: xxviii+842+xviii+iv pp., 40 pls. Jena.

Orian, A. J. E. 1957. Saltatoria, Phasmida and Dictyoptera of Mauritius. *Annals and Magazine of Natural History* (12) **10**: 513–520.

Palisot de Beauvois, A. M. F. J. 1805–1821. *Insectes recueillis en Afrique et en Amérique dans les royaumes d'Oware et de Benin, à Saint-Domingue et dans les Etats-Unis, pendant les années 1786–1797.* 276 pp., 38 pls. Paris.

Ragge, D. R. 1955. *The wing-venation of the Orthoptera Saltatoria with notes on Dictyopteran wing-venation.* vi+159 pp. London.

—— 1969. A revision of the African species of *Pseudorhynchus* Serville (Orthoptera: Tettigoniidae). *Bulletin of the British Museum (Natural History)* (Entomology) **23**: 167–190.

Redtenbacher, J. 1900. *Die Dermatopteren und Orthopteren (Ohrwürmer und Geradflügler) von Österreich-Ungarn und Deutschland.* 148 pp. Wien.

Rochebrune, A. T. de 1884. Diagnoses d'Arthropodes nouveaux propres à la Sénégambia (premier supplément). *Bulletin de la Société philomathique de Paris* (7) **8**: 28–31.

Saussure, H. de 1870–1879. Études sur les insectes Orthoptères. *Mission scientifique au Mexique et dans l'Amerique centrale.* Recherches zoologiques **6** (1). 533 pp., 8 pls. Paris.

—— 1876–1877. Mélanges Orthopterologiques 5. 3 Gryllides. *Mémoires de la Société de Physique et d'Histoire Naturelle de Genève* **25** (1): i–xxii, 1–352.

—— 1894. Fam. Gryllidae. *Biologia Centrali Americana.* Insecta. Orthoptera **1**: 198–284.

Saussure, H. de & Zehntner, L. 1894. Notice morphologique sur les Gryllotalpiens. *Revue suisse de Zoologie* **2**: 403–430.

Scudder, S. H. 1869. Revision of the large, stylated, fossorial crickets. *Memoirs of the Peabody Academy of Science* **1**: 1–28.

Sismondo, E. 1979. Stridulation and tegminal resonance in the tree cricket *Oecanthus nigricornis* (Orthoptera: Gryllidae: Oecanthinae.) *Journal of Comparative Physiology* **129**: 269–279.

Smithie, F. B. 1975. *Naturalist's Color Guide.* 23 pp. New York.

Tindale, N. B. 1928. Australasian mole-crickets of the family Gryllotalpidae (Orthoptera). *Records of the South Australian Museum* **4**: 1–42.

Vayssière, P. & Mimeur, J. 1926. *Les insectes nuisibles au cotonnier en Afrique occidentale Française.* 175 pp., 20 pls. Paris.

Index

Principal references are in **bold**; synonyms are in *italics*.

Titles to be published in Volume 46

The generic and tribal classification of spore-feeding Thysanoptera (Phlaeothripidae: Idolothripinae).
By L. A. Mound & J. M. Palmer.

A revision of the Afrotropical mole-crickets (Orthoptera: Gryllotalpidae).
By B. C. Townsend.

Key to the genera of galerucine beetles of New Guinea, with a review of *Sastra* and related new taxa (Chrysomelidae).
By Sharon L. Shute.

The Afrotropical dacetine ants (Formicidae).
By Barry Bolton.

Photoset by Rowland Phototypesetting Ltd, Bury St Edmunds, Suffolk
Printed in Great Britain by Henry Ling Ltd., Dorchester

Bulletin of the
British Museum (Natural History)

Key to the genera of galerucine beetles of New Guinea, with a review of *Sastra* and related new taxa (Chrysomelidae)

Sharon L. Shute

Entomology series
Vol 46 No 3 28 July 1983

The *Bulletin of the British Museum (Natural History)*, instituted in 1949, is issued in four scientific series, Botany, Entomology, Geology (incorporating Mineralogy) and Zoology, and an Historical series.

Papers in the *Bulletin* are primarily the results of research carried out on the unique and ever-growing collections of the Museum, both by the scientific staff of the Museum and by specialists from elsewhere who make use of the Museum's resources. Many of the papers are works of reference that will remain indispensable for years to come.

Parts are published at irregular intervals as they become ready, each is complete in itself, available separately, and individually priced. Volumes contain about 300 pages and several volumes may appear within a calendar year. Subscriptions may be placed for one or more of the series on either an Annual or Per Volume basis. Prices vary according to the contents of the individual parts. Orders and enquiries should be sent to:

Publications Sales,
British Museum (Natural History),
Cromwell Road,
London SW7 5BD,
England.

World List abbreviation: *Bull. Br. Mus. nat. Hist.* (Ent.)

The Entomology series is produced under the general editorship of the
Keeper of Entomology: Laurence A. Mound
Assistant Editor: W. Gerald Tremewan

ISSN 0524–6431

Entomology series
Vol 46 No 3 pp 205–266

British Museum (Natural History)
Cromwell Road
London SW7 5BD

Issued 28 July 1983

Key to the genera of galerucine beetles of New Guinea, with a review of *Sastra* and related new taxa (Chrysomelidae)

Sharon L. Shute
Department of Entomology, British Museum (Natural History), Cromwell Road, London SW7 5BD

Contents

Synopsis

A key is given to the 47 genera of the chrysomelid subfamily Galerucinae represented in New Guinea. The current status of the 34 species previously listed in the genus *Sastra* Baly is reviewed; 22 new combinations are proposed and four combinations are reinstated. Three genera, 14 species and two subspecies are described as new. One specific synonym is newly established, and one species is recalled from synonymy. Two of the genera have been erected primarily for the inclusion of the New Guinean species with toothed pronota which were previously assigned to the genus *Sastra*. Keys, figures of the diagnostic features and distribution maps are provided.

Introduction

The Chrysomelidae is one of the largest coleopterous families with upwards of 50,000 described species distributed throughout the world. The adults and larvae are entirely phytophagous, therefore the family is one of the most economically important amongst the Coleoptera. The majority of species tend to be host-specific or are restricted to one particular plant family although, compared with the number of species in the family, relatively few of the host plants have been recognised.

The genera dealt with in this paper belong to the Galerucinae, which is the largest of the 17 subfamilies recognised in the Chrysomelidae (for key, see Gressitt & Kimoto 1963) and has over 5,000 described species distributed throughout the world; these are most abundant in tropical regions. Adult Galerucinae feed on the parenchyma of the leaves and many species are known to visit flowers (Knuth, 1908; Maulik, MS.). The larvae may be either leaf- or root-feeders. In the majority of species pupation takes place in the soil but in others the pupae are attached to leaves.

As a result of making routine identifications of Galerucinae from New Guinea it became

Bull. Br. Mus. nat. Hist. (Ent.) **46** (3): 205–266 Issued 28 July 1983

apparent that many of the genera occurring in this region are inaccurately and poorly defined in the literature. This has resulted in new species being assigned to the wrong genera, and genera being placed in the wrong tribe. Diagnosis of genera which are widespread in Asia and occur in New Guinea are provided by Gressitt & Kimoto (1963), while Gressitt & Hornabrook (1977) give a key to the principal beetle families represented in New Guinea. The latter work includes a section on the Galerucinae, with a list of the principal genera found in New Guinea. However, many problems remain in identifying Galerucinae from this region. The present work aims to rectify the most serious omission by providing a comprehensive key to the New Guinean genera of the subfamily. Wherever possible this key is based on type-species and takes into account undescribed species and genera as well as those already described. Several genera not previously recorded from this region are included.

In the present study special attention has been paid to *Sastra* which was found to constitute a particularly heterogeneous assemblage of species; of the 35 species listed by Wilcox (1971) only nine are now retained in this genus. The type-material of these nine species is listed and a redefinition of *Sastra* is provided. All nine species are from New Guinea, and a study of further undescribed species indicates that the geographical range of this genus is confined to this region (Map 1). Eleven species from New Guinea, previously assigned to *Sastra*, were found to constitute two new genera which are described here; these are principally characterised by having a tooth-like process on the lateral margin of the pronotum. The largest of the two genera, *Polysastra*, has been erected primarily for the inclusion of nine of the above mentioned species, but I have examined a further 43 undescribed species. A full revision of these is not included in the present paper but 16 are described below as representatives of the 'species groups' (see discussion under *Polysastra*) into which the genus has been divided. It is hoped that this preliminary study will facilitate further research by future workers.

A third new genus from New Guinea has also been described here as the species it contains are frequently incorrectly assigned to *Sastra*. This genus is also interesting as it exhibits characters uncommon in the Galerucinae. All genera, groups and species have been dealt with in alphabetical order. Genitalia and other diagnostic features are illustrated for as many species as possible.

Depositories

AMNH	American Museum of Natural History, New York, U.S.A.
ANIC	Australian National Insect Collection, Division of Entomology, CSIRO, Canberra, Australia.
BMNH	British Museum (Natural History), London, U.K.
BPBM	Bernice P. Bishop Museum, Honolulu, Hawaii, U.S.A.
DPI	Department of Primary Industry, Konedobu, Papua New Guinea.
IP	Institut für Pflanzenschutzforschung, Eberswalde, D.D.R.
ITZ	Institut voor Taxonomische Zoölogie, Zoölogisch Museum, Amsterdam, Netherlands.
MCSN	Museo Civico di Storia Naturale, Genoa, Italy.
MCZ	Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, U.S.A.
MIZSU	Museo ed Istituto di Zoologia Sistematica dell' Università, Turin, Italy.
MNHN	Muséum National d'Histoire Naturelle, Paris, France.
MNHU	Museum für Naturkunde der Humbolt-Universität, Berlin, D.D.R.
NMV	National Museum of Victoria, Melbourne, Victoria, Australia.
NR	Naturhistoriska Riksmuseet, Stockholm, Sweden.
OIP	Ohlmus collection, Department of Primary Industry, Konedobu, Papua New Guinea.
RHN	Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands.
RWH	R. W. Hornabrook collection, Wellington, New Zealand.
SAM	South Australian Museum, Adelaide, Australia.
SMT	Staatliches Museum für Tierkunde, Dresden, D.D.R.
USNM	National Museum of Natural History, Washington, D.C., U.S.A.
UQ	University of Queensland, St Lucia, Queensland, Australia.

Acknowledgements

I extend my grateful thanks to the following specialists who have been kind enough to lend me type-specimens or other material from their institutions listed above. Mlle N. Berti, the late Mrs D. H. Blake, Dr J. P. Duffels, Dr F. Hieke, Dr R. W. Hornabrook, Dr J. Krikken, Dr E. G. Matthews, Dr G. B. Monteith, Dr A. Neboiss, Dr T. Nyholm, Mr H. Ohlmus, Prof. U. Parenti, Dr J. N. L. Stibick (formerly DPI), Dr E. Tortonese, Dr J. White (formerly MCZ), and Dr R. E. White. I also thank all my colleagues who have offered help and advice. My very special thanks are due to Dr G. A. Samuelson of the Bishop Museum without whose help and patience this paper would not have been possible. I am also indebted to him for the loan of the principal part of the material on which the work is based. Finally I thank Mr T. Nagatani (BPBM) for the figures of the whole specimens, Mrs B. Wavell-Craven for typing the species descriptions and the BMNH photography unit for the photographs.

Key to genera of Galerucinae from New Guinea

1 At least three-quarters of length of antennal socket behind mid-line of eye. Length of frons from anterior margins of antennal sockets to base of labrum not less than that of socket.
Tarsal claws appendiculate. Frons never forming a transverse ridge 2

– At least three-quarters of length of antennal socket in front of mid-line of eye. Length of frons from anterior margins of antennal sockets to base of labrum not more than that of a socket 14

2 (1) Pronotum with distinct dorsal depressions. Apex of tibiae with or without a ventral spur 3

– Pronotum without dorsal depressions. Apex of tibiae with a ventral spur 6

3 (2) Length of gena at narrowest point less than half that of eye. Apex of tibiae with a ventral spur. Basal segment of antenna distinctly longer than third segment. Elytron becoming broader in apical half. Basal segment of hind tarsus equal to or longer than rest of segments combined 4

– Length of gena at narrowest point clearly exceeding half that of eye. Apex of tibiae without a ventral spur. Basal segment of antenna only slightly longer than third segment. Elytra parallel-sided. Basal segment of hind tarsus not longer than segments 2 and 3 combined .... ***COLEOCRANIA*** Jacoby

4 (3) Distance between antennal sockets at least half width of socket. Basal segment of antenna equal to or shorter than segments 2 and 3 combined. Length of frons from anterior margins of antennal sockets to base of labrum not greater than 2·5× that of a socket 5

– Distance between antennal sockets less than half width of socket. Basal segment of antenna at least 1·5× as long as segments 2 and 3 combined. Length of frons from anterior margins of antennal sockets to base of labrum at least 3·0× that of a socket. ***LUPERUS*** Müller

5 (4) Body length not exceeding 10 mm. Basal segment of hind tarsus 1·5× as long as rest of segments combined. Eye at least 4·0× the length of an antennal socket. Antennal segments slender and individually straight. Pronotum not more than 1·4× broader than long, posterior half with shallow sublateral depressions which are sometimes confluent, forming a single transverse depression. Elytron not more than 3·5× length of pronotum. .... ***NEOLEPTA*** Jacoby

– Body length at least 15 mm. Basal segment of hind tarsus shorter than rest of segments combined. Eye not more than 3·0× length of an antennal socket. Antennal segments slender, segments 4–11 individually curved. Pronotum not less than 1·9× broader than long. Elytron at least 5·0× length of pronotum (unevenly convex). ***PALAEOSASTRA*** Jacoby

6 (2) Basal segment of antenna distinctly shorter than segments 2 and 3 combined, third segment 4·5× as long as second, segments 3–8 individually curved. Pronotum not more than 1·7× broader than long. Elytra subparallel-sided. Body length not exceeding 7·0 mm .... ***ALOPENA*** Baly

– Basal segment of antenna as long as or longer than segments 2 and 3 combined. Other characters not so combined 7

7 (6) Lateral margin of pronotum with a small rounded tooth at about middle. Length of frons from anterior margins of antennal sockets to base of labrum at least 2·5× length of socket. Basal segment of antenna at least twice as long as frons. Elytron *c.* 4·0× length of pronotum. Antenna and legs slender. Basal segment of hind tarsus slightly longer than segments 2 and 3 combined. Dorsum appearing glabrous... ***ASTRIDELLA*** Laboissière

– Lateral margins of pronotum without a median tooth. Other characters not so combined 8

8 (7) Length from hind margin of antennal sockets to hind margin of eyes not more than 0·25× length of socket. Length of frons from anterior margins of antennal sockets to base of labrum 2·5–3·0× that of socket........ 11

– Length from hind margin of antennal sockets to hind margin of eyes at least 0·75× that of socket. Length of frons from anterior margins of antennal sockets to base of labrum not more than 2·25× that of socket........ 9

9 (8) Frons with a longitudinal median carina. Length of gena at narrowest point more than half that of antennal socket. Apex of tibiae without a ventral spur. Basal segment of hind tarsus shorter than segments 2 and 3 combined........ ***YULENIA*** Jacoby

– Frons without a longitudinal median carina. Length of genat at narrowest point distinctly less than half that of antennal socket. Apex of tibiae with a ventral spur. Basal segment of hind tarsus longer than segments 2 and 3 combined 10

10 (9) Outer margin of antennal socket contiguous with inner margin of eye, eye large, width greater than that of area between eyes. Distance between antennal sockets not more than half width of socket. Length of third antennal segment equal to or shorter than second. Pronotum widest at middle, sides evenly rounded. Elytra parallel-sided and evenly convex. Basal segment of hind tarsus as long as rest of segments combined ***NEODRANA*** Jacoby

– Outer margin of antennal socket separated from inner margin of eye by at least half a sockets width. Eye moderately large, width less than that of area between eyes. Distance between antennal sockets more or less equal to width of socket. Length of third antennal segment 1·5–2·0× that of second. Pronotum widest in anterior half, width decreasing gradually towards base. Elytra subparallel-sided, greatest convexity of elytron about middle. Basal segment of hind tarsus 1·25× length of rest of segments combined........ ***LOMIRANA*** Laboissière

11 (8) Length of gena at narrowest point equal to or exceeding half that of antennal socket....... 12

– Length of gena at narrowest point distinctly less than half that of antennal socket, emargination of gena usually contiguous with anterior margin of eye.
Body length not exceeding 7 mm........ 13

12 (11) Body length exceeding 7 mm. Pronotum at least 2·2× broader than long. Width between antennal sockets at least that of socket. Antennal segments 4–11 individually curved ***PRASYPTERA*** Baly

– Body length not exceeding 7 mm. Pronotum not more than 1·4× broader than long. Distance between antennal sockets not more than half width of socket. Antennal segments not curved .... ***LUPERUS*** Müller

13 (11) Apical segment of maxillary palp stout, shorter than preceding segment. Frons with a small median longitudinal carina. Third antennal segment equal in length to second, fourth segment at least 4·5× length of third. Pronotum not less than 1·4× broader than long. Basal segment of hind tarsus longer than rest of segments combined ***NEODRANA*** Jacoby

– Apical segment of maxillary palp slender, longer than preceding segment. Frons without median carina. Third antennal segment at least 3× as long as second, fourth segment 1·25× length of third. Pronotum not more than 1·2× broader than long. Basal segment of hind tarsus shorter than rest of segments combined........ ***MICROLEPTA*** Jacoby

14 (1) Lateral margins of pronotum with a distinct, acute or rounded tooth-like projection at about middle.
Third antennal segment distinctly longer than fourth. Fore coxal cavities open behind. Tarsal claws bifid. Primary setal pores usually tuberculate........ 53

– Lateral margins of pronotum never with a distinct median projection 15

15 (14) Tarsal claws bifid 16

– Tarsal claws appendiculate........ 39

16 (15) Width of elytral epipleuron at level of mid coxa 2·0–3·0× greater than at level of hind coxa, epipleuron becoming obsolete or distinctly narrower around level of hind coxa.

Elytron sometimes expanded laterally beyond epipleura. Pronotum with or without dorsal depressions 17
– Width of elytral epipleuron at level of mid coxa never more than 1·5× greater than at level of hind coxa, width of epipleuron either remaining more or less the same for at least three-quarters of its length or becoming gradually narrower from around hind coxa towards apices. Elytron not expanded laterally beyond epipleura. Pronotum with one or more dorsal depressions 28

17 (16) Elytron distinctly costate. Pronotum transverse, greatest width equal to that of elytra at humeral angles. Fore coxal cavities closed behind. Legs stout. Basal segment of hind tarsus shorter than segments 2 and 3 combined. Dorsum setose .... ***PLERONEXIS*** Weise
– Elytron not costate. Other characters not so combined 18

18 (17) Pronotum without doral depressions. Dorsum appearing glabrous 19
– Pronotum with one or more dorsal depressions. Dorsum glabrous or setose 22

19 (18) Elytra broadly ovate. Elytron often expanded laterally beyond epipleura. Pronotum at least 2·0× broader than long 20
– Elytra subparallel-sided. Elytron not expanded laterally beyond epipleura. Pronotum never more than 1·7× broader than long .... ***NOTONICEA*** Hincks ♂

20 (19) Apical segment of maxillary palp globose, almost entirely contained within preceding segment, apex concave. Metasternum with a large anterior peg-like process projecting forward between mid coxae. Expanded area of elytron not more than 1·2× wider than epipleuron. Legs and antennal segments stout. Elytra often banded or bicoloured ***ANOIDES*** Weise
– Apical segment of maxillary palp conical or subglobose, not more than half length of segment contained within preceding segment. Other above characters not so combined 21

21 (20) Metasternum with a large anterior peg-like process projecting forward between mid-coxae. Elytron strongly convex, expanded area lateral to epipleura at least 1·5–2·0× wider than epipleura .... ***PARANOIDES*** Vachon
– Metasternum without anterior peg-like process, Elytron moderately convex, expanded area lateral to epipleura not more than 1·2× wider than epipleura ...... ***MOROKASIA*** Jacoby

22 (18) Elytra distinctly setose. Apex of tibiae without a ventral spur. Dorsum usually unicolorous, rarely metallic 23
– Elytra glabrous. Apex of tibiae with or without a ventral spur. Dorsum usually with transverse bands or patches, sometimes partially or entirely metallic 24

23 (22) Head with vertex strongly convex, appearing glabrous and impunctuate. Pronotum at least 2·5× broader than long, maximum width less than that of elytra at humeri, surface with deep transverse sublateral depressions and shallow median depression, sparsely setose. Body length not usually exceeding 7 mm. Legs and antennal segments slender .... ***BUPHONIDA*** Baly
– Head without vertex convex, densely setose and punctured throughout. Pronotum not more than 1·9× broader than long, maximum width equal to that of elytra at humeri, surface densely setose with two more or less circular sublateral depressions in anterior half, median area convex. Body length usually exceeding 10 mm. Legs and antennal segments stout .... ***MENIPPUS*** Clark

24 (22) Elytra broadly ovate, elytron expanded laterally beyond epipleuron. Pronotum with two small more or less circular sublateral depressions or a single, narrow transverse depression in anterior half .... ***OIDES*** Weber
– Elytra not broadly ovate or elytron expanded laterally. Pronotum with sublateral depressions which are either confluent or occupy almost two-thirds of the surface area 25

25 (24) Frons triangular, anterior third either depressed or declivous. Inter-antennal area with a longitudinal median carina. Pronotum narrowing at level of dorsal depressions, depressions narrow, often confluent, anterior third strongly convex. Elytra often pyriform 27
– Frons forming a more or less evenly convex ridge. Inter-antennal area without a median carina. Pronotum not becoming narrower at level of dorsal depressions, depressions broad, occupying almost two thirds of the surface area, anterior half convex at sides. Elytra never pyriform 26

26 (25) Apical segment of maxillary palp subglobose. Male with a deep triangular emargination at apex of abdomen; female with a small curved or triangular notch (may be obscured

by setae). Pronotal depressions present in both sexes .... ***GALERUMAEA*** Hincks
– Apical segment of maxillary palp conical. Male with a shallow curved emargination at apex of abdomen; female with apex evenly rounded. Male with pronotal depressions absent or very weak .... ***NOTONICEA*** Hincks
27 (25) Apex of tibiae with a ventral spur (may be small or obscured by setae). Posterior two-thirds of elytron distinctly convex, humeral area delimited by a distinct transverse depression .... ***PAPUANIA*** Jacoby
– Apex of tibiae without a ventral spur. Posterior two-thirds of elytron not distinctly convex, humeral area never delimited by a transverse depression ***AULACOPHORA*** Chevrolat
28 (16) Length of gena at narrowest point at least 0·67× that of antennal socket 29
– Length of gena at narrowest point less than 0·5× that of antennal socket (emargination of gena usually contiguous with anterior margins of eye (Fig. 15) 33
29 (28) Elytra strongly rugose throughout, rugosities often forming long irregular carinae. Males of some species with a large tooth on hind femur.
Eyes prominent. Frons triangular with a median longitudinal carina. Pronotum with distinct lateral margins, dorsal depressions narrow. Legs and antennal segments slender. (Figs 114, 115).. genus **A**
– Elytra not rugose or carinate. Hind femur never toothed in male 30
30 (29) Apex of tibiae with a ventral spur. Elytra pyriform, posterior two-thirds of elytron distinctly convex, humeral area often delimited posteriorly by a narrow transverse depression. Lateral margins of pronotum distinct. Third antennal segment shorter than fourth. Dorsum appearing glabrous .... ***PAPUANIA*** Jacoby
– Apex of tibiae without a ventral spur. Elytra parallel-sided to subovate, posterior two-thirds of elytron not distinctly convex, humeral area never delimited by a transverse depression. Lateral margins of pronotum absent or barely discernible. Third antennal segment longer than fourth. Dorsum setose or glabrous.................. 31
31 (30) Dorsum appearing glabrous. Puncturation indistinct on head and pronotum. Elytra distinctly and evenly punctured, often metallic, sometimes bicoloured or banded ***MOMAEA*** Baly
– Dorsum distinctly setose. Puncturation strong and dense on head and pronotum. Elytra strongly and densely punctured 32
32 (31) Frons medially convex with a strong anterior declivity. Eye at least three times as long as the narrowest part of gena. Elytra parallel-sided, usually bi-coloured. Basal segment of hind tarsus equal in length to that of segments 2 and 3 combined .... ***ATYSA*** Baly
– Frons with sides convex, no anterior declivity. Eye not more than one and a half times as long as the narrowest part of the gena. Elytron becoming gradually wider from base of humeri onwards. Basal segment of hind tarsus shorter than segments 2 and 3 combined.. ***GALERUCELLA*** Crotch
33 (28) Frons with a median triangular depression, sides distinctly convex. Apical segment of maxillary palp conical, longer than preceding segment. Eye large and prominent, at least 3× length of an antennal segment. Antennal segments slender, third segment at least one and a half times longer than fourth segment. Pronotum transverse, sublateral depressions distinct but often ill-defined. Elytra setose, densely and more or less uniformly punctured throughout, surface evenly convex. Legs slender. Basal segment of hind tarsus 0·5× longer than preceding segment. (Figs 1, 102–112) ***SASTRA*** Baly (p. 247)
– Frons without median depression, being either medially convex or forming a more or less evenly convex ridge. Other characters not so combined................................ 34
34 (33) Elytra densely setose, puncturation distinct and dense 35
– Elytra glabrous or only very sparsely setose, puncturation fine 37
35 (34) Anterior third of pronotum strongly convex across entire width, median region of convex area narrower than rest, convex area distinctly elevated above posterior two-thirds and less coarsely punctured. Eyes large and protuberant. Frons more or less triangular, often declivous anteriorly. Elytra 3–4× longer than broad, parallel-sided or becoming broader just before apices, some species with narrow longitudinal ribs.. ***DYSIODES*** Weise
– Not as above 36
36 (35) Eye not more than twice the length of an antennal socket. Pronotum without lateral margins, sublateral depression broad but not confluent. Inner ungue of tarsal claws

equal in length to or only slightly shorter than outer ungue. Elytra parallel-sided, some species with narrow longitudinal ribs. Antennal segments enlarged and flattened in some species .... ***ATYSA*** Baly

– Eye at least three times as long as antennal socket. Pronotum with narrow but distinct lateral margins, sublateral depressions confluent, occupying at least two-thirds of surface area. Inner ungue of tarsal claw not more than half length of outer segment. Elytra becoming gradually broader from humeral area onwards. Antennal segments filiform .... ***PONERIDEA*** Weise

37 (34) Frons triangular, sometimes medially convex and declivous, length from anterior margins of antennal sockets to base of labrum usually exceeding that of a socket. Antennal segments 3 and 4 subequal 38

– Frons forming a more or less evenly convex ridge, length from anterior margins of antennal sockets to base of labrum not exceeding that of a socket. Antennal segment three at least 1·4× length of fourth .... ***MOMAEA*** Baly

38 (37) Pronotum not more than 1·4× broader than long, sides subparallel, sublateral depression indistinct, often confluent. Elytra parallel- or subparallel-sided. Antennal segments elongate and slender. Male with basal segment of all tarsi greatly enlarged. Abdomen with two long conical appendages at middle of posterior margin of second segment .... ***HOPLASOMA*** Jacoby

– Pronotum at least 2·0× broader than long, sides rounded, sublateral depressions distinct, rarely confluent. Elytron becoming gradually broader from base of humeral area onwards, apical quarter often broadly rounded. Antennal segments 6–11 short and stout. Male with only basal segment of fore tarsus enlarged. Abdominal appendages absent .... ***PAUMOMUA*** Jacoby

39 (15) Elytron with at least six narrow longitudinal ribs, punctures situated between ribs (maybe weakly indicated) 40

– Elytron without any indication of ribs, puncturation confused 42

40 (39) Apex of tibiae without a ventral spur. Pronotum at least 2·4× broader than long. Distance between antennal sockets greater than width of a socket. Underside densely setose. Legs moderately stout. Basal segment of hind tarsus shorter than segments 2 and 3 combined .... ***PLESISTIA*** Maulik

– Apex of tibiae with a ventral spur. Pronotum not more than 1·5× broader than long. Distance between antennal sockets not more than width of a socket. Underside sparsely setose. Legs slender. Basal segment of hind tarsus longer than segments 2 and 3 combined 41

41 (40) Elytral epipleuron becoming distinctly narrower above level of hind coxa, width then decreasing gradually until epipleuron becomes obsolete prior to apex. Frons never modified in male .... ***LOMIRANA*** Laboissière

– Elytral epipleuron not distinctly narrowed above hind coxa, width decreasing gradually below level of hind coxa, epipleuron continuing to apex. Frons often excavated or modified in male .... ***DIAPHAENIDEA*** Laboissière

42 (39) Apical segment of maxillary palp distinct from preceding segment, being either subglobose or conical. Third segment subcylindrical. Frons never excavated in male 43

– Apical segment of maxillary palp situated in the apex of the inner angle of the preceding segment, third segment greatly enlarged and triangular. Frons excavated in male.

Fore coxal cavities open behind. Distance between antennal sockets greater than width of a socket. Basal segment of antenna longer than segments 2 and 3 combined. Basal segment of hind tarsus longer than rest of segments combined

PALPAENIDEA Laboissière

43 (42) Maximum width of elytral epipleuron at level of metepisternum equal to or exceeding that of metepisternum, epipleuron becoming distinctly narrower at about level of hind coxa. Dorsum appearing glabrous 44

– Maximum width of elytral epipleuron at level of metepisternum not more than half that of metepisternum, epipleuron either abbreviated at about level of mid metasternum or fairly constant in width for entire length. Dorsum with or without setae 49

44 (43) Length of gena at narrowest point distinctly less than half that of antennal socket. Pronotum without dorsal depressions 45

– Length of gena at narrowest point not less than half that of antennal socket. Pronotum with or without dorsal depressions 47

45 (44) Apex of tibiae with a ventral spur. Elytron becoming gradually broader from humeral angles onwards, apical half convex, epipleuron becoming obsolete before apex. Legs slender, hind tibia evenly curved. Basal segment of hind tarsus longer than rest of segments combined 46

– Apex of tibiae without a ventral spur. Elytron ovate, weakly convex, epipleuron distinct to apex. Legs moderately slender, hind tibia straight. Basal segment of hind tarsus shorter than segments 2 and 3 combined .... ***CASSENA*** Weise

46 (45) Pronotum not more than 1·4× broader than long, sublateral depressions weak, sometimes confluent, forming a narrow transverse depression, maximum convexity of pronotum in apical half, posterior margin evenly curved .... ***NEOLEPTA*** Jacoby

– Pronotum at least 1·6× broader than long, dorsal depressions absent, surface evenly convex, posterior margin sinuate at sides. Vertex may be excavated in ♂ ***MONOLEPTA*** Chevrolat

47 (44) Apex of tibiae without a ventral spur. Pronotum without dorsal depressions. Third segment of maxillary palp enlarged, length at least 2·5× that of apical segment. Antennal segments 9–11 distinctly enlarged in ♂ .... ***CNEORANE*** Baly

– Apex of tibiae with a ventral spur (may be small). Pronotum with or without dorsal depressions. Third segment of maxillary palp not obviously enlarged, length not more than 1·5× length of apical segment. Apical segments of antenna not enlarged in ♂ 48

48 (47) Antennal segments stout, third segment 2·0–2·5× length of fourth segment. Pronotum at least 1·7× broader than long, surface with two small more or less circular sublateral depressions. Legs stout. Basal segment of hind tarsus slightly longer than segments 2 and 3 combined .... ***SYNODITA*** Chapuis

– Antennal segments slender, segments 3 and 4 subequal. Pronotum not more than 1·3× broader than long, dorsal depressions absent. Legs slender. Basal segment of hind tarsus longer than rest of segments combined .... ***LOMIRANA*** Laboissière

49 (43) Pronotum evenly convex, dorsal depressions absent. Apical segment of maxillary palp subglobose, apex truncate. Antennal segments short and stout. Dorsum appearing glabrous.

Length of gena at narrowest point not less than half that of antennal socket. Maximum width of elytron in apical third. Puncturation fine. Basal segment of hind tarsus shorter than segments 2 and 3 combined .... ***ASTENA*** Baly

– Pronotum unevenly convex, dorsal depressions distinct. Apical segment of maxillary palp conical. Antennal segments elongate and slender. Dorsum glabrous or setose 50

50 (49) Frons triangular, maximum convexity at middle, longitudinal median carina present. Dorsum appearing glabrous or sparsely setose. Elytron usually pyriform, humeral area delimited by a narrow transverse depression .... ***PARIDEA*** Baly

– Frons forming a transverse ridge, maximum convexity at sides, longitudinal median carina absent. Dorsum densely setose (if glabrous then length not exceeding 6 mm). Elytron never pyriform, humeral area not delimited by a transverse depression 51

51 (50) Head and pronotum appearing impunctate. Elytron finely punctured throughout. Dorsum either glabrous throughout or elytra sparsely setose. Length of eye not more than twice that of an antennal socket. Body length not usually exceeding 5 mm. Hind tibia evenly curved .... ***PHYLLOCLEPTIS*** Weise

– Dorsum distinctly punctured and setose throughout. Length of eye at least 3·0× that of antennal socket. Body length exceeding 6 mm. Hind tibia straight 52

52 (51) Length of gena at narrowest point equal to that of three eye facets combined. Maximum convexity of frons at middle. Distance between antennal sockets not less than width of a socket. Interantennal area with a small pit-like depression. Lateral margins of pronotum barely discernible, sublateral depressions small and shallow, rarely confluent. Elytra usually weakly metallic, punctures contiguous .... ***APOPHYLIA*** Thomson

– Length of gena at narrowest point less than that of two eye facets combined. Maximum convexity of frons at sides. Distance between antennal sockets less than width of a socket. Interantennal area without depression. Lateral margins of pronotum distinct, at least two-thirds of surface area depressed. Elytra non-metallic, punctures separated by at least their own width .... ***PONERIDEA*** Weise

53 (14) Length of eye never more than 2·25× that of an antennal socket or twice the width. Length of gena at narrowest point at least half that of an antennal socket 54

– Length of eye at least 3·0× that of an antennal socket and 2·5–3·0× the width. Length of gena at narrowest point less than half that of an antennal socket.
Male with a deep triangular emargination at apex of abdomen 56

54 (53) Antennae less than half the length of body, segments short and stout. Body shape suggestive of *Galeruca* sp. Pronotal primary setal pores not tuberculate. Length of metasternum not more than twice that of intercoxal process of mesosternum. (Fig. 40) genus **B**

– Antennae exceeding half body length, segments elongate and slender. Body elongate, elytra parallel- or subparallel-sided. Pronotal primary setal pores tuberculate. Length of metasternum at least 3·5× that of intercoxal process of mesosternum 55

55 (54) Eye at least three times longer than shortest point of gena. Pronotum indistinctly punctured, submedian lateral tooth small and rounded, anterior third and area between outer margin of sublateral depression and base of tooth equally convex, disc sometimes with a narrow ovate depression which may become confluent with sublateral depressions. Elytra more or less evenly convex, never rugose or carinate, rarely metallic, usually bicoloured or with colour pattern. Basal segment of hind tarsus evenly convex dorsally. (Figs 116–119) .... ***MARMINA*** gen. n. (p. 217)

– Eye not more than twice as long as the shortest point of the gena. Pronotum strongly and distinctly punctured, lateral margin with tooth well developed, surface unevenly convex, sublateral depressions ill-defined, disc strongly convex with a small shallow anterior and posterior depression. Elytra robust, surface rugose and unevenly convex. Basal segment of hind tarsus tectiform .... ***GRONOVIUS*** Jacoby

56 (53) Male. Apex of abdomen emarginate, basal segment of fore or mid tarsi enlarged. Antenna may have enlarged or modified segments 57

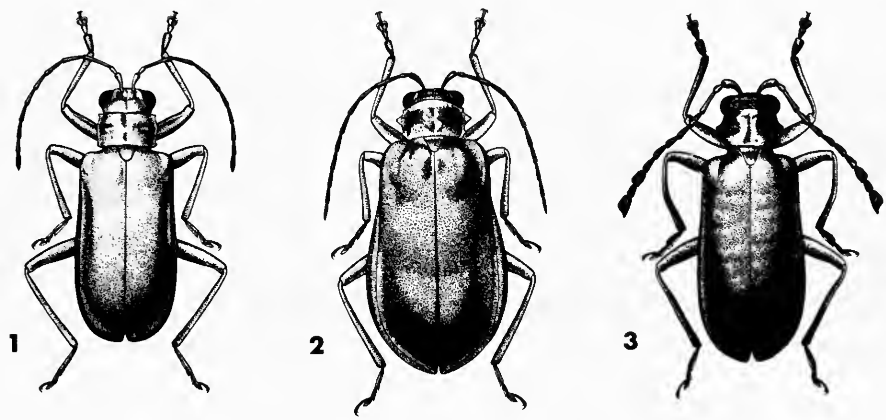
– Female. Apex of abdomen evenly rounded or with small triangular emargination. Basal segment of tarsi not enlarged. Antennal segments filiform, none enlarged or modified 58

57 (56) Antennal segments 4–11 short and stout, segments 9 and 11 distinctly enlarged and ventrally flatterned (Figs 5, 6), these segments glabrous beneath. Mid tibia irregularly curved (Fig. 4). Basal segment of mid tarsus with greater enlargement than fore tarsus (Fig. 12). Elytra more or less evenly convex. (Fig. 3)................. ***DREEUS*** gen. n. (p. 215)

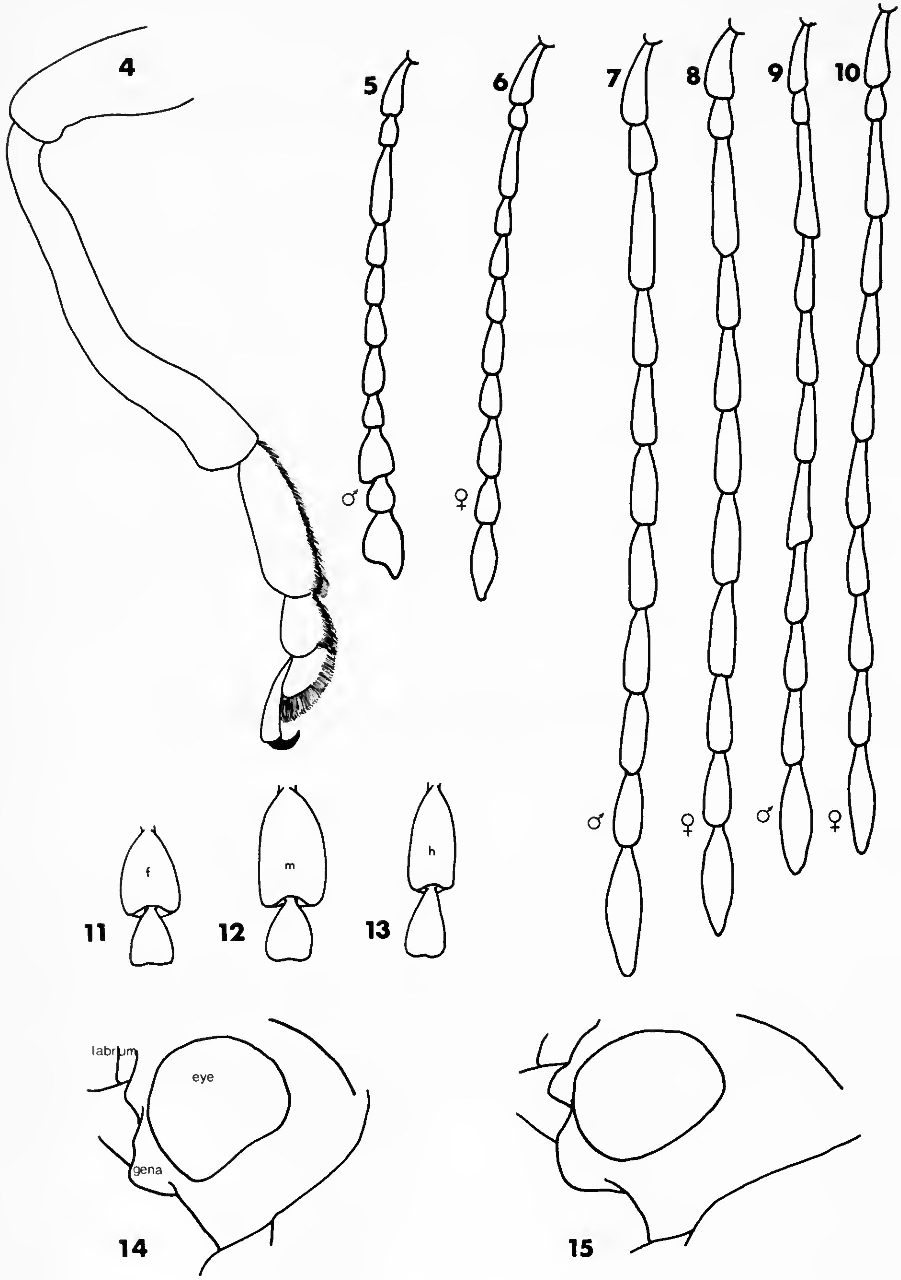
– Antennal segments 4–11 elongate and slender, no modifications present (Figs 7, 8). Basal segment of fore tarsus with greatest enlargement. Elytra with variable facies, sometimes rugose, carinate or evenly convex. (Figs 120–150) ***POLYSASTRA*** gen. n. (p. 220)

58 (56) Antennal segments 4–11 stout, segment 11 twice as long as segment 10. Apex of abdomen with a triangular emargination (Fig. 20). Elytron more or less evenly convex. (Fig. 3) .... ***DREEUS*** gen. n. (p. 215)

– Antennal segments 4–11 elongate and slender, segment 11 not more than 1·25× longer than segment 10. Apex of abdomen evenly rounded. Elytra with variable facies, sometimes rugose, carinate or evenly convex. (Figs 120–150) ***POLYSASTRA*** gen. n. (p. 220)



Figs 1–3 General habitus of Galerucini genera treated here. 1, *Sastra* sp. ♂. 2, *Polysastra* sp. ♂. 3, *Dreeus* sp. ♂.



Figs 4–15 Distinguishing generic characters. 4, *Dreeus distinctus*, mid tibia of male showing sinuation. 5–10, comparative proportions of antennal segments of (5) *Dreeus* sp. ♂; (6) *Dreeus* sp. ♀; (7) *Polysastra* sp. ♂; (8) *Polysastra* sp. ♀; (9) *Marmina* sp. ♂; (10) *Marmina* sp. ♀. 11–13, *Dreeus* sp., comparative proportions of basal segment of fore, mid and hind tarsi. 14, 15, diagram of head showing comparative emargination of genae of (14) *Polysastra* sp.; (15) *Sastra* sp.

DREEUS gen. n.

Type-species: *Dreeus distinctus* sp. n.

General form. Body elongate, elytra subparallel-sided, appearing glabrous. Combined length of antennal segments slightly less than half that of body, third segment at least 1·5× length of third segment, segments 9 and 10 enlarged and glabrous beneath in male (Figs 5–6). Eyes large and prominent. Pronotum transverse, lateral margins produced into a tooth in anterior half, width at anterior margin less than that of head plus eyes, maximum width more or less equal to that of head plus eyes and slightly less than that of elytra at humeri, disc convex medially, with a small shallow depression anteriorly and posteriorly, and a sublateral depression on either side. Primary setal pores weakly tuberculate. Elytra more or less uniformly convex, usually unicolorous, epipleura becoming obsolete at about apical quarter. Underside setose, fore coxal cavities open behind. Apex of abdomen in male with a triangular emargination which almost reaches hind margin of segment (Fig. 20); female with a small triangular emargination at apex (Fig. 21). Legs slender, mid tibia in male distinctly and irregularly sinuate in basal half (Fig. 4), hind tibia weakly curved, apices in both sexes without ventral spurs or lateral spines. Basal segment of hind tarsus slightly longer than that of segments 2 and 3 combined, basal segment of fore and mid tarsi slightly shorter, basal segment of mid tarsus in male distinctly enlarged, length 1·3× greater than that of basal segment of fore tarsus (Fig. 12). Claws bifid.

Diagnosis. Gena deeply emarginate medially, emargination reaching anterior margin of eye, maximum width of gena less than half that of antennal socket. Apical segment of maxillary palp conical, length more or less equal to that of preceding segment. Labrum small, not obscuring sides of mandibles. Pseudoclypeus distinct, length almost equal to that of labrum. Frons with sides convex, length less than that of antennal socket, sockets separated by less than the width of a socket, anterior margins level with those of eyes. Postantennal swellings convex, distinctly elevated above level of vertex, contiguous with frons between antennal sockets and separated medially by a narrow longitudinal groove which terminates just above median depression of frons. Vertex with irregular puncturation, coronal 'suture' present. Eyes large and prominent, length at least 2·4× that of antennal socket. Proportional lengths of antennal segments similar in both sexes (Figs 5, 6), segments 9 and 11 enlarged in male. Pronotum irregularly punctured, width at lateral tooth on average 1·2× greater than minimum posterior width, tooth usually with apex acute, depressions shallow, median depressions often joined by a narrow longitudinal groove. Scutellum triangular, maximum width more or less equal to length, apex rounded. Elytra almost parallel-sided, average length 3·6× greater than width, maximum width not more than 1·2× greater than width at level of apex of scutellum, posthumeral sublateral depression absent, surface more or less evenly convex, appearing glabrous but minute setae confined within margins of punctures, puncturation irregular. Underside minutely punctured throughout, metasternum convex, 2·8× longer than mesosternum, fore coxal cavities open behind. Legs slender, hind leg 0·7× length of elytron and 1·4× length of fore and mid legs. Length of fore tibia slightly less than that of mid and hind tibiae, male with sinuate mid tibia (Fig. 4) and weakly curved hind tibia. All femora more or less equal in width. Tarsi as in Figs 11–13. Aedeagus forming a chitinous tube with a large complex apical process (Figs 22, 23). Basic structure of female genitalia as in *Polysastra*; the principal differences are a distinct constriction between the vagina and bursa (Fig. 34), distinctly longer styli (Fig. 37), and the proportions of the hemitergites (Figs 34, 37) and ligular largely exposed (Fig. 34).

Distribution. Irian Jaya, Papua New Guinea.

Discussion. Compared with other genera found in this region, this genus is unusual in having both the antennal segments and the mid tibiae modified in the male. It is also unusual amongst the Galerucinae in having the maximum enlargement of the basal tarsal segment in the male on the mid leg, not on the fore leg.

Several New Guinean species referable to this genus have been examined but only one is described here as the others are not represented by sufficient material to make accurate diagnoses. This genus does not appear to be closely related to the other genera from this region, but belongs to the same group of primarily Australasian Galerucini, including *Sastra* and the new genera described here, which are characterised by their elongate form and antennal structure (Figs 1, 2).

Dreeus distinctus sp. n.

(Figs 3, 4–6, 11–13, 20–24, Map 10)

General form. Length 6·9–11·3 mm. Elytra parallel to subparallel-sided, evenly convex, posthumeral, sublateral, longitudinal carinae absent; elytral setae minute, not extending beyond margins of punctures, sometimes a few sparse erect setae on intervals, puncturation confused. Pronotum transverse with a distinct tooth on the lateral margins. Male with antennal segments 9 and 11 enlarged (Fig. 5). Head and pronotum concolorous, dark reddish to pitchy brown. Elytron reddish brown, pitchy brown or dark green with a weak aeneous lustre. Underside and legs in reddish species concolorous, dark testaceous to orange-brown; pitchy brown and green specimens with abdomen pale testaceous and rest of underside dark reddish to pitchy brown. Male with mid femur irregularly curved (Fig. 4), basal segment of fore and mid tarsi enlarged, maximum enlargement in mid tarsi (Fig. 12).

Diagnosis. Head with frons medially depressed, sides convex, elevation more or less equal to that of postantennal swellings; swellings well defined and elevated above level of vertex, derm smooth and shinning with weak microsculpture. Vertex coarsely and irregularly punctured, punctures large, shallow and often confluent, derm distinctly microsculptured, setae long, fine and appressed. Pronotum transverse, male on average 1·6× broader than long, female 1·75× broader than long, development of lateral tooth variable, more acute in small specimens, one side sometimes more developed than the other in male, lateral depressions distinct but shallow, median anterior depression shallow, delimited posteriorly by two small admedian convexities, posterior median depression often ill-defined; puncturation dense and irregular, size and density of punctures variable, size not normally greater than twice that of punctures on humeral area of elytra, width apart not normally exceeding that of a puncture, derm distinctly microsculptured, particularly in median depressions, setae minute, not extending beyond margins of punctures. Scutellum triangular with broadly rounded apex, median area minutely punctured with short, appressed, grey setae, derm microsculptured. Elytron 3·6× longer than broad. Elytra in male more or less parallel-sided, sometimes slightly broader in apical quarter, female subparallel-sided, becoming gradually broader from around middle to a maximum width just anterior to apical quarter. Maximum width *c.* 1·3× greater than the width at the level of the apex of the scutellum, apices evenly rounded in both sexes, derm densely and irregularly punctured throughout giving a slightly rugose appearance, punctures not more than their own width apart, setae minute, not extending beyond the margins of the punctures, epipleura narrow, extending to apex. Underside densely and minutely punctured, metepisternum weakly granulate, punctures not separated by more than their own width, setae short and appressed, sides of metasternum with puncturation and microsculpture as metepisternum, setae slightly longer and finer, median area of metasternum, sparsely punctured, microsculpture composed of irregular, converging, horizontal lines, setae longer and more erect than at sides. Femora with large shallow punctures 1·0–1·5× their own width apart on basal three-quarters, becoming denser at apices, setae short, fine and appressed. Tibiae granulate, setae increasing in density towards apices, short and stout, basal segment of mid tarsus in male 1·5× as long as basal segment of fore tasus. Apex of abdomen incised in both sexes (Figs 20–21). Wing fully developed. Genitalia (Figs 22–24).

Holotype ♂, **Papua New Guinea**: NE, Laiagam, 2180 m, 18–19.vi.1963, m.v. light (*J. Sedlacek*) (BPBM).

Paratypes. **Papua New Guinea**: 25 ♂, 19 ♀, same data as holotype (10 ♂, 6 ♀ BMNH); 7 ♂, 15 ♀, Lake Siruki, 2550 m, 14–17.vi.1965 (3 ♂, 3 ♀ BMNH); 10 ♂, 10 ♀, Kepilam, 2420–2490 m, 20–23.vi.1963, light-trap (all *J. Sedlacek*) (5 ♂, 5 ♀ BMNH); 10 ♀, Kotuni, south slope Mt Otto, 2200 m, 10–15.viii.1959 (5 ♀ BMNH); 1 ♂, Purosa, camp Okapa, 1950 m, 27.ix.1959; 1 ♀, Kimi, Creek Camp, NE. slopes Mt Michael, 1980 m, 29.viii.1959 (all *L. T. Brass*), (AMNH); 2 ♂, Moke, i.x.1957 (*J. Smart*); 1 ♀, 1 ♀, Waisa nr Okapa, *c.* 5000 ft, 15.ii.1965; 1 ♀, Okapa, *c.* 5000 ft, 4–13.ii.1965 (all *M. E. Bacchus*) (BMNH); 1 ♂, 1 ♀, Okapa, Purosa, 1700–2000 m, 18.i.1966; 4 ♂, 3 ♀, 6·4 km W. Wabag, 2020 m, 13.vi.1963 (all *J. Sedlacek*) (1 ♂, 2 ♀ BMNH); 3 ♀, Malgi, Mt Giluwe, 2400 m, 25–30.v.1961, light-trap, heavy rain (*J. L. & M. Gressitt*); 3 ♂, 6 ♀, Dimifa, SE. Mt Giluwe, 2200 m, 9–12.x.1958, light-trap (1 ♂, 2 ♀ BMNH); 3 ♂, 10 ♀, ridge W. of Dimifa, S. Mt Giluwe, 2350 m, 11.x.1958; 1 ♂, SE. slope Mt Giluwe, 2450 m, 12.x.1958; 4 ♂, 4 ♀, Mt Otto, 2200 m, 24.vi.1955 (all *J. L. Gressitt*) (1 ♂, 1 ♀ BMNH); 1 ♂, Yaibos 1650 m, 10–11.vi.1963 (*J. Sedlacek*); 1 ♀, Ahl Valley, Nondugle, 1750 m, 8.vii.1955 (*J. L. Gressitt*); 1 ♀, Korgua, 1450 m, 30.v.1963 (*H.C.*); 1 ♂, Daulo Pass, 2400 m (Asaro Chimbu Div.) 14.vi.1955, light-trap (*J. L. Gressitt*); 11 ♀, Tambul, 2200 m, 26.v.–7.vi.1963, light-trap (*J. Sedlacek*) (5 ♀ BMNH); 1 ♂, 25,600, Moke, 6400 ft, m.v. light, 17.iv.1962; 1 ♂, 1 ♀, 19,025, 19,026, Aiyura, 1959 (*J. H. Barrett*) (DPI); 1 ♀, Wau Creek, Wau, 1200–1500 m, 16–18.ix.1964 (*M. Sedlacek*); 1 ♂, Mt Michael, Lufa, 10.iii.1974 (*R.*

Hornabrook); 1 ♀ Samedata, 17.iii.1974, at light; 1 ♀, W. Highlands, Kandep, 25.iii.1971 (*R. Hornabrook*) (all specimens BPBM unless otherwise stated).

COMMENTS. This species appears to be fairly common throughout the central region of NE. Papua New Guinea. Apart from colour variation there appears to be a certain amount of inter-population variation. It is possible that more than one species may have been included here, although no specific differences could be found in the genitalia of these forms.

MARMINA gen. n.

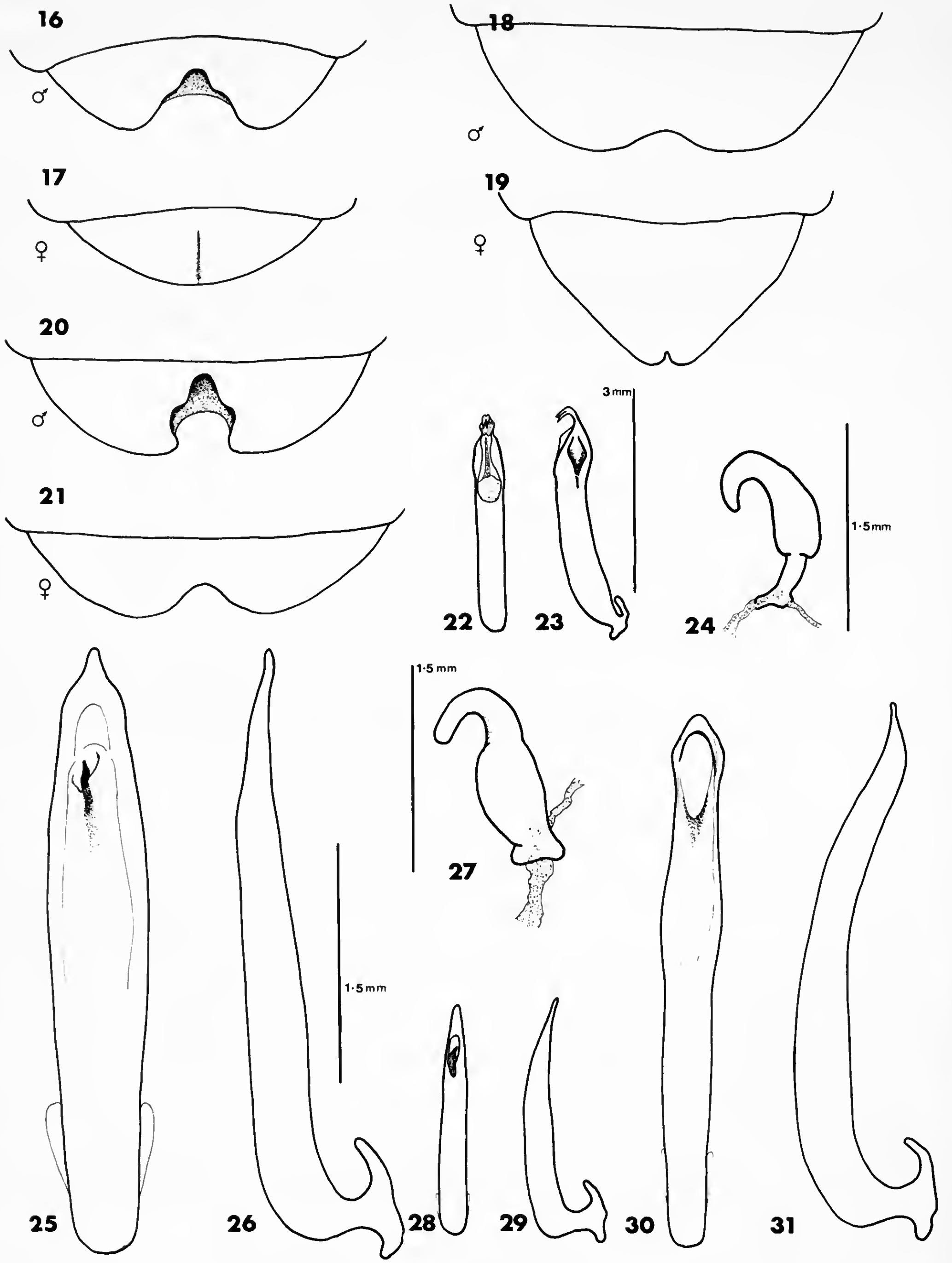
Type-species: *Sastra quadripustulata* Jacoby.

GENERAL FORM. Body elongate, elytra subparallel-sided to subovate. Dorsum appearing glabrous. Length of antenna just exceeding 0·5× that of body, third segment at least 1·3× length of fourth segment and 1·8× length of second. Eyes not protuberant. Pronotum transverse, lateral margins with a small rounded tooth just above midline, width at anterior margin equal to or just exceeding that of head plus eyes, maximum width not greater than that of elytra at humeri. Primary setal pores distinctly tuberculate; pronotal depressions occupying at least two-thirds of surface area, sublateral depression transverse, often confluent with ovate depression on disc. Elytra unicolorous, bicoloured or patterned. Epipleura present to apical quarter, broad in basal half then narrowing towards apices from around level of hind coxae onwards. Elytron sometimes explanate laterally beyond epipleuron. Underside setose. Fore coxal cavities open behind. Apex of abdomen in ♂ with a shallow even emargination (Fig. 18), ♀ with a short longitudinal bifurcation (Fig. 19). Legs moderately robust, similar in both sexes, apex of tibiae without ventral spur, lateral apices with a comb-like row of short spines. Length of basal segment of fore and mid tarsi more or less equal to combined length of the two preceding segments; basal segment of hind tarsus 1·2× as long as preceding segments combined. Claws distinctly bifid. Basal segment of fore tarsus in ♂ only slightly more enlarged than basal segment of mid tarsus.

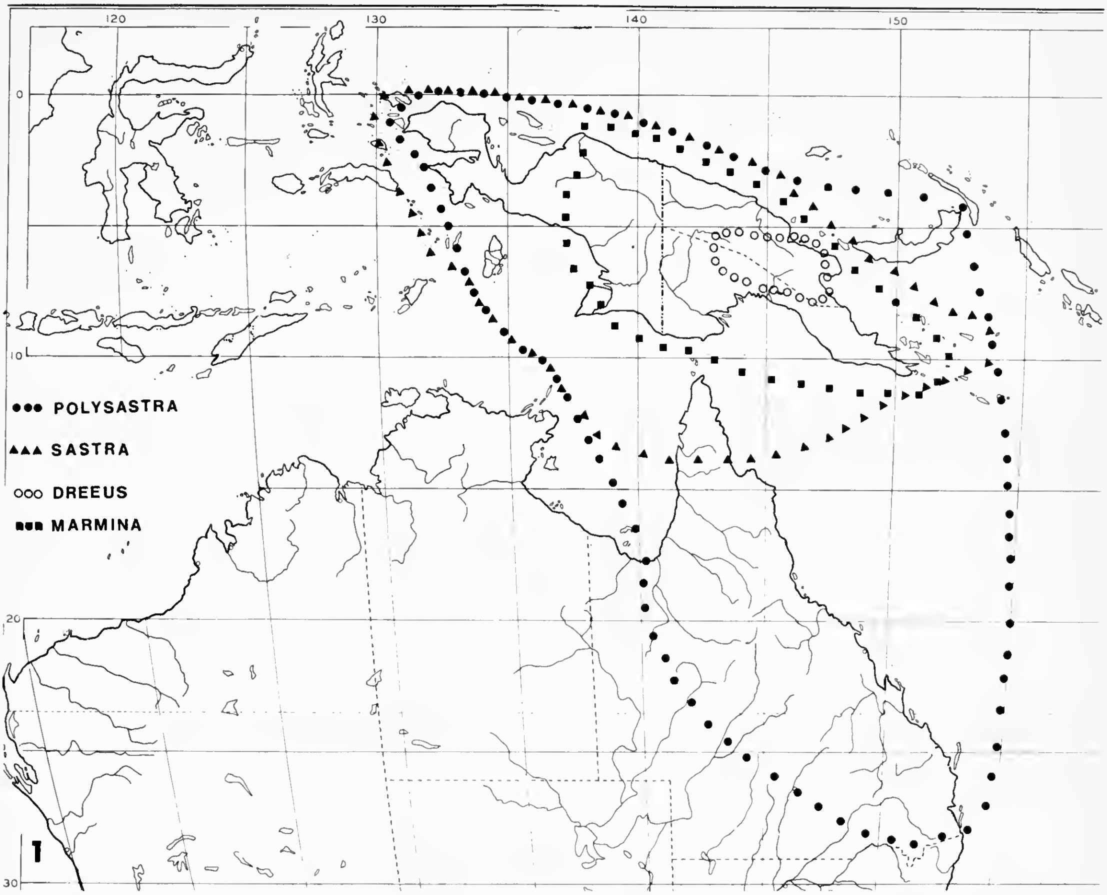
DIAGNOSIS. Head with gena weakly emarginate medially, minimum length of gena not less than 0·5× length of antennal socket. Apical segment of maxillary palp subconical, length slightly greater than preceding segment. Labrum small, not obscuring sides of mandibles. Pseudoclypeus distinct, length slightly greater than half that of labrum. Frons medially convex and somewhat declivous anteriorly, length not greater than that of an antennal socket. Antennal sockets separated by not more than half width of a socket, anterior margins level with those of eyes but not contiguous. Postantennal swellings transverse, delimited behind by a narrow horizontal groove and separated medially by a longitudinal extention of the coronal 'suture', anterior margins of swellings confluent with frons between antennal sockets and of similar elevation. Vertex with puncturation sparse or almost absent. Antennae similar in both sexes (Figs 9, 10), segments filiform, basal segment 1·25× length of second, segment 3 at least 2·0× length of second and 1·3× fourth, fifth segment slightly shorter than fourth, segments 6, 7 and 8 subequal and slightly shorter than fifth, ninth and tenth segments equal, slightly shorter than eighth, segment 11 1·2× length of tenth, all segments setose, density of setae increasing from segment 4 onwards. Scutellum on average 1·2× longer than broad, apex subtruncate, often medially convex. Elytron on average 2·5–3·0× longer than broad, average maximum width 1·2× width at apex of scutellum. Post humeral sublateral longitudinal depression almost absent or weakly indicated by raised outer margin, surface without carinae or rugosities. Underside minutely punctured throughout. Metasternum transverse, length at least 2× that of mesosternum, medially convex. Basic structure of ♀ genitalia, bursa, position and structure of styli etc. as in (Fig. 38). Median lobe of aedeagus in ♂ forming an elongate chitinous tube (Figs 25–31). General structure as in *Polysastra* (Fig. 32).

DISTRIBUTION. Papua New Guinea, Irian Jaya, Trobriand Islands, D'Entrecasteaux Islands (Map 1).

DISCUSSION. This genus is superficially similar to *Paumomua*; it differs principally in having a tooth on the lateral margin of the pronotum, antennal segments of different proportions, e.g. third segment longer than fourth, and a longer apical segment of the maxillary palp. Species with subparallel-sided elytra may also appear similar to certain *Momaea* species, but again can be distinguished from these by the structure of the pronotum and the distance between the anterior margin of the frons and the eyes. Nothing is known about the biology of this genus.



Figs 16–31 *Polysastra, Dreeus* and *Marmina*, taxonomic characters. 16–21, apical segment of abdomen showing emargination of (16) *Polysastra* sp. ♂; (17) *Polysastra* sp. ♀; (18) *Marmina* sp. ♂; (19) *Marmina* sp. ♀; (20) *Dreeus* sp. ♂; (21) *Dreeus* sp. ♀. 22, 23, *Dreeus distincta* ♂, aedeagus, dorsal and lateral view. 24, *D. distincta* ♀, spermatheca. 25, 26, *Marmina quadripustulata* ♂, aedeagus, dorsal and lateral view. 27, *M. quadripustulata* ♀, spermatheca. 28, 29, *Marmina* sp. B ♂, aedeagus, dorsal and lateral view. 30, 31, *Marmina* sp. A ♂, aedeagus, dorsal and lateral view. (Figs 25–31 drawn to same scale.)



Map 1 Range of genera treated here.

Key to species of *Marmina*

1 Elytron with colour pattern, puncturation distinct but not strong, punctures on humeral area 1–2× their own width apart 2
– Elytron unicolorous or with humerus similar in colour to pronotum, puncturation fine, punctures minute, 3–4× their own width apart 3
2 Elytra subparallel-sided, deep submetallic green with irregular transverse median and subapical yellow patches, these not contiguous with lateral margin. Head, pronotum and scutellum dull testaceous to golden yellow. Vertex posterior to post antennal swellings usually dark reddish brown. Tibiae and tarsi deep reddish brown to pitchy black. Length 8·5–11·5 mm (Fig. 116). Genitalia as in Figs 25–27. (Trobriand Islands, D'Entrecasteaux Islands)..... ***quadripustulata*** (p. 220)
– Elytra subovate, lateral margin explanate beyond epipleuron, colour testaceous with irregular dark brown markings (Fig. 118). Pronotum testaceous with ill-defined reddish brown patches on disc, lateral tooth and sublateral posterior convex areas. Head with frons, post antennal swellings and vertex dark reddish brown, intermediate areas testaceous. Underside testaceous. Basal three-quarters of femora and basal quarter of tibiae testaceous, rest of legs dark reddish to pitchy brown. Antennal segments with base of each segment testaceous. Length ♂ 9·0 mm. (Fig. 118.) Aedeagus as in Figs 30, 31. (NE. Papua New Guinea)species A (p. 220)
3 Elytron deep bluish to pitchy brown, reddish along margins, humerus light orange-brown. Head, pronotum and scutellum dull testaceous. Metasternum and abdomen pitchy brown to black, rest of underside testaceous. Tibiae usually darker in colour than femora. Antennal segments 1–5 dull orange-brown, rest of segments becoming darker towards apices. Length 9·1–9·3 mm. (Fig. 117.) (SE. Papua New Guinea).......... ***basalis*** (p. 220)

– Elytron deep purplish black with a weak brassy lustre on humeral area, lateral margins and epipleuron testaceous. Head, pronotum and scutellum dull testaceous. Coloration of underside as in *basalis*. Legs testaceous. Antennal segments 1–4 testaceous, rest dark reddish brown. Length ♂ 7·5 mm. (Fig. 119.) Aedeagus as in Figs 28, 29. (SE. Irian Jaya) ... species **B** (p. 220)

Marmina quadripustulata (Jacoby) **comb. n.**

(Figs 25–27, Map 10)

Sastra quadripustulata Jacoby, 1904: 402. LECTOTYPE ♀, TROBRIAND ISLANDS (BMNH), here designated [examined].

ADDITIONAL MATERIAL EXAMINED

Trobriand Islands: 1 ♂ (paralectotype) (MCZ). **D'Entrecasteaux Islands**: 1 ♂, 1 ♀ (paralectotypes), Fergusson Island (BMNH); 2 ♀, Goodenenough Island, xii. [18]96 (*A. S. Meek*); 3 ♀, Fergusson Island, ix–xii. [18]95 (*A. S. Meek*) (MCZ).

Marmina basalis (Jacoby) **comb. n.**

(Fig. 117, Map 10)

Sastra basalis Jacoby, 1886: 72. LECTOTYPE ♂, NEW GUINEA: Fly River (*L. N. D'Albertis*) 1876–77 (MCZ), here designated [examined].

ADDITIONAL MATERIAL EXAMINED

New Guinea: 1 ♀ (Wallace) (BMNH).

Two further species belonging to this genus are included in the key but are not described as they are represented by only single specimens. Collecting data of these species are as follows.

Marmina sp. **A**

(Figs 30, 31, 118, Map 10)

Papua New Guinea: 1 ♂, Morobe District, Mt Kaindi nr Wau, montane forest, *c.* 8000 ft, 16.iv.1965 (*J. J. H. Szent-Ivany*) no. 19031 (DPI).

Marmina sp. **B**

(Figs 28, 29, 119, Map 10)

Irian Jaya: 1 ♂, Sabang, 12.vii.1907 (*Lorentz*) (ITZ).

POLYSASTRA **gen. n.**

Type-species: *Sastra costatipennis* Jacoby.

GENERAL FORM. Body elongate, elytra subparallel-sided to pyriform. Dorsum either distinctly setose or with setae confined within margins of punctures. Combined length of antennal segments equal to at least three-quarters of body length, third segment at least 1·4× length of fourth segment and 1·8× second, segments filiform in both sexes (Figs 7, 8). Eyes large and protuberant. Pronotum transverse, lateral margins produced into a distinct tooth in anterior half, apex acute or broadly rounded, anterior width not exceeding that of head plus eyes, maximum width at least 1·3× greater than that of head plus eyes but not exceeding that of elytra at humeri; sublateral depressions present either side of disc, disc with small anterior and posterior depressions which may be confluent in some species. Primary setal pores tuberculate. Elytra variable, evenly convex, costate or rugose, with uniform or irregular puncturation, derm translucent to metallic. Epipleuron present to apical quarter, a supra-costal flange present in some species. Underside setose. Fore coxal cavities open behind. Apex of abdomen in male with a deep triangular emargination, evenly rounded in female (Figs 16, 17). Legs slender, similar in both sexes, apices of tibiae without ventral spurs, lateral edges with a comb-like row of short spines. Basal segment of fore and mid tarsi slightly shorter than segments two and three combined, basal segment of hind tarsus slightly longer than segments two and three combined. Claws distinctly bifid. Basal segment of fore tarsus enlarged in male.

DIAGNOSIS. Head with gena emarginate medially, emargination almost reaching anterior margin of eye (Fig. 14). Apical segment of maxillary palp conical, length more or less equal to that of preceding segment. Labrum small, not obscuring sides of mandibles. Pseudoclypeus distinct, length not more than half that of labrum. Frons either medially convex or entirely depressed, length not greater than half that of an antennal socket, sockets separated by less than width of socket, anterior margins level with those of eyes. Post-antennal swellings elevated above level of vertex, contiguous with frons between sockets and separated medially by a narrow longitudinal groove which terminates at frons. Vertex with or without irregular puncturation, coronal 'suture' usually distinct. Eyes large and prominent, at least 3·0× longer than antennal socket. Antenna with basal segment becoming gradually broader towards apex, length at least twice that of second segment, third segment 2·5× length of second and 1·5–2·0× that of fourth; fourth, fifth, sixth and seventh segments subequal, eighth segment slightly shorter than seventh, segments eight, nine and ten subequal, segment eleven 1·5× length of tenth segment, all segments setose. Pronotum transverse, degree of convexity and development of depressions variable, lateral tooth well developed with apex acute or weakly developed and broadly rounded, lateral margins always produced, never evenly rounded, type and density of puncturation variable. Scutellum triangular, length either equal to or slightly greater than width, apex rounded or subtruncate. Average length of elytron 3·3× longer than broad, facies variable (see notes on species groups). Underside finely punctured throughout, metasternum convex, at least 3·0× as long as mesosternum. Legs of similar form in both sexes, slender, length of hind leg equal to or slightly longer than that of elytron, length of fore and mid legs slightly less than that of hind leg, all femora more or less equal in width, tibiae more or less straight.

Aedeagus a narrow, dorsally curved, chitinous tube, the apical section dorsally flattened. Viewed dorsally (Fig. 32) it occupies the length of the abdomen and lies laterally, slightly to the right of the gut. The median lobe and the basal struts are fused, forming a single unit. The median orifice is large and opens on the dorsal side of the apical section. The apex usually has some form of projection, ranging from a blunt knob to a large tooth. The aedeagus lies within a membranous bag, the genital atrium, to which the arms of the tegman (Sharp & Muir, 1912) or spiculum (Varmer, 1969) are attached at the apical quarter (Fig. 32), the remaining strut of the spiculum remaining free of the atrium wall until it enters the basal orifice where it curves upwards between the curved basal struts. The non-eversible portion of the endophallus, which is continuous with the median ejaculatory duct at the base of the aedeagus, appears as a dark tube within the median section of the median lobe; it becomes confluent with the internal sac in the apical quarter which appears as a dark amorphous shape and can be seen protruding at the base of the median orifice together with the projecting apex (which varies in shape) of the supporting sclerite, which lies in an inverted S-shape inside the sac at rest. On evagination the sclerite runs through the centre of the sac and through the phallotreme where it fuses with the outer wall of the sac, acting as a supporting strut (Fig. 33). The evaginated sac is small and simple in shape but the walls are fairly robust, being covered with setae and spicules (Fig. 33). The sac has proved very difficult to evaginate in this genus, principally due to the narrow structure of the aedeagus and the rigidity of the supporting sclerite which lies in an inverted S-shape at rest and has to be 'popped' straight. Therefore the sac has not been used here as a specific diagnostic character.

The female genitalia (of which the spermatheca is used here as a specific diagnostic character) are enclosed in a membranous tube, the apices of which are the chitinous plates of the eighth tergite and sternite (hemitergites); long stout setae are present along the anterior margin of both plates; with the ventrites removed the gut can be seen lying in front of the genitalia (Fig. 35). The anterior margin of the entrance to the gut forms a shallow membranous fold which is attached to the posterior region of the eighth tergite, the hind region of the gut entrance forming a deep blind fold, the hind margin of which is attached to the anterior margins of the base of the styli (Fig. 36). The styli comprise two elongate hollow tubes which, at the base, open into the region between the fold formed by the hind margin of the gut and the anterior wall of the vagina (Fig. 36). There are no distinct coxities or supporting valvifers. Each stylus has a tuft of long, curved, sensory setae at the apices. The hind margins of the base of the styli are attached to the anterior margin of the wall of the vagina; the entrance to the vagina (vulva) lies between the styli and the ligular (Fig. 36). The vagina and the bursa copulatrix (Fig. 35) form a convoluted membranous sack; there is no distinct elongated constriction between the vagina and the bursa as in *Dreeus* (Fig. 34). The spermatheca (Fig. 35), which is a strongly chitinous curved structure, is attached to the dorsal side of the anterior end of the bursa by a short membranous duct (Fig. 35). The spermathecal gland may be seen attached to the posterior region of the spermatheca above the attachment of the spermathecal duct (Fig. 35). The oviduct arises from the median region of the ventral wall of the bursa. The principal interspecific diagnostic characters are the shape of the spermatheca and ligular, length of styli and the density and position of the setae on the hemitergites. The general structure, i.e., proportions of the vagina, bursa and plates etc. are generic characters (Figs 34–38).

DISTRIBUTION. Papua New Guinea, Irian Jaya, New Britain, Trobriand Islands, D'Entrecasteaux Islands, N. Australia (Map 1).

DISCUSSION. *Polysastra* is closely allied to *Sastra*. Both genera belong to a group of primarily Australasian Galerucini which is characterised by an elongate form (Figs 1–3), emarginate genae (Fig. 14) and the third antennomere being at least 1·3× longer than the fourth. *Polysastra* differs from *Sastra* (Fig. 1) in having a distinct tooth on the lateral margin of the pronotum (Fig. 2) less emarginate genae, and variable elytral facies ranging from evenly convex to rugose or carinate; the dorsal puncturation and setal length are also very variable. The two genera have similar geographic ranges (Map 1).

Very little is known about the biology of *Polysastra*. Species occur in a wide range of habitats throughout New Guinea, from high moss forest to lowland marshy areas. Various species have been found on cultivated plants in gardens and plantations but there is no precise record of feeding. No species have as yet been found to be of any significant economic importance. The majority have been collected at various forms of light, which suggests that they may be most active at night.

In comparison with most other genera of Galerucinae the species of *Polysastra* exhibit an unusually wide range of external variation. A study of those treated here and *c*. 40 undescribed species showed that certain groupings, based on external characters, were evident within the genus. Eleven such species groups have been defined here, to facilitate the preliminary identification of members of this genus. Further groupings based on additional characters may be apparent within these species groups and additional notes have been provided on each group to supplement the information derived from the primary group key. At present it is not feasible to describe all the new species examined, but at least one new species from each 'group' is described here as a representative example.

At first sight the external characters exhibited by these species groups may suggest that they represent monophyletic groups. However, lack of geographic correlation between the species of a group, the occurrence of intermediate species, and the pattern of variation and overlap in genitalic characters lends little to support this supposition. The occurrence of similar aedeagal forms in externally dissimilar groups which show relative constancy of spermathecal structure suggests that genitalic characters may prove more useful in elucidating phyletic relationships of *Polysastra* species than similarities in external form. It is hoped that this preliminary study will provide a helpful basis for future work on this genus.

Groups and species are dealt with in alphabetical order. Type-data etc. of those species transferred from *Sastra* are included with the descriptions of the new taxa. The general form and genitalia of all the species dealt with in this genus are illustrated.

Key to species groups based on external characters

Note. The term pubescent is used here in a specific context to describe a fine, dense covering of setae.

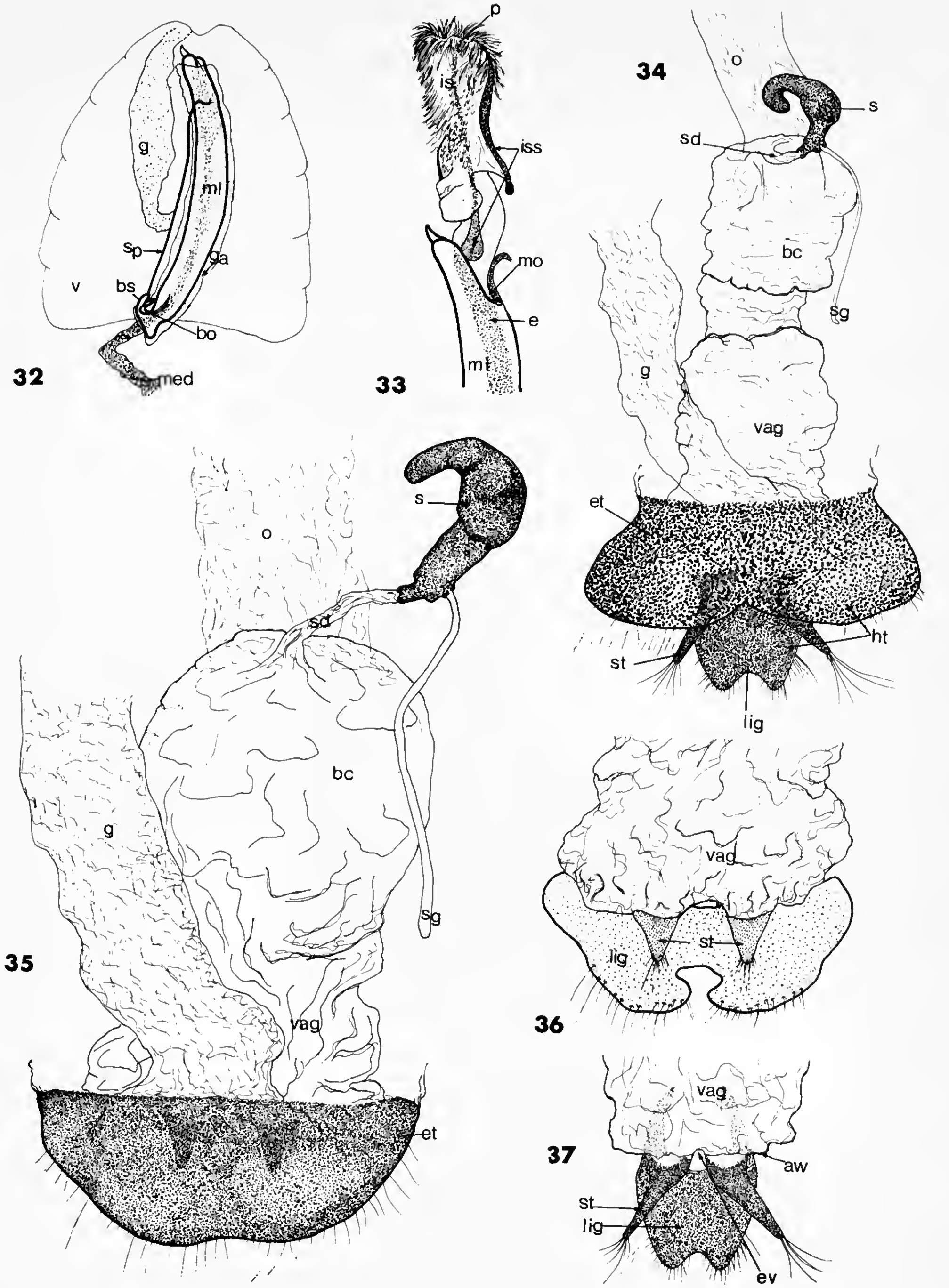
1 Elytron appearing distinctly setose or pubescent, setae extending well beyond margins of punctures 2

– Elytron appearing glabrous, majority of setae minute and confined within the margins of the punctures. Sometimes with sparse, erect setae at intervals 4

2 (1) Pronotum very densely punctured throughout, punctures fine to granulate; setae dense or forming pubescence. Elytron non-metallic, setae dense or forming pubescence. *C*. 8·0–11·0 mm 3

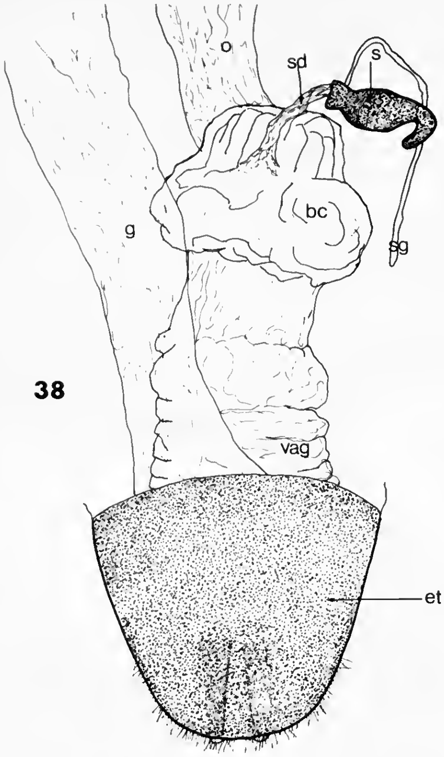
– Pronotum with irregular puncturation, punctures large and mostly shallow, setae sparse but distinct. Elytron metallic or with a metallic lustre, one or both margins of the post-humeral sublateral longitudinal depression forming cariniform ridges; setae distinct but not forming pubescence. *C*. 8·0–11·0 mm .... ***bicostata***-group (p. 226)

3 (2) Elytron with outer margin of post-humeral sublateral longitudinal depression forming a distinct ridge, lateral margin somewhat explanate beyond epipleuron in median third; elytral puncturation fine to granular, punctures usually contiguous, derm usually

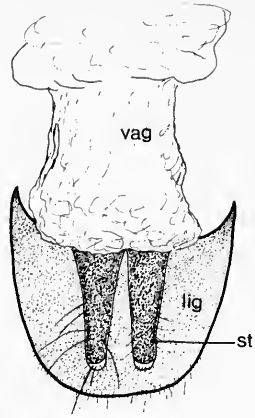


Figs 32–37 *Polysastra* and *Dreeus*, genitalia. 32, *Polysastra* sp., diagram of abdomen showing position of aedeagus at rest. 33, *Polysastra* sp., apex of aedeagus showing internal sac evaginated. 34, *Dreeus* sp., general structure of female genitalia. 35, *Polysastra* sp., general structure of female genitalia. 36, *Polysastra* sp., position of styli and ligular with eight tergite removed. 37, *Dreeus* sp., position of styli and ligular with eighth tergite removed.

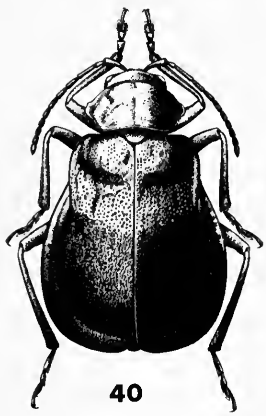
aw – anterior wall of vagina; bc – bursa copulatrix; bo – basal orifice; bs – basal struts; e – endophallus; et – eighth tergite; ev – entrance to vagina; g – gut; ga – genital atrium wall; ht – hemitergites; is – internal sac; iss – internal supporting sclerite; lig – ligular (eighth sternite); med – median ejaculatory duct; ml – median lobe (aedeagus); mo – median orifice; o – oviduct; p – phallotreme; s – spermatheca; sd – spermathecal duct; sg – spermathecal gland; sp – spiculum (tegmen); st – styli; v – ventrites; vag – vagina.



38

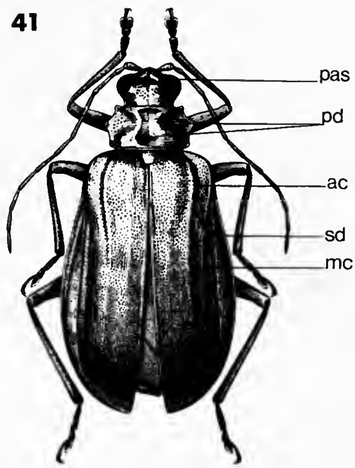


39



40

41



Figs 38, 39 *Dreeus* sp., female genitalia. 38, general structure. 39, position of styli and ligular with eighth tergite removed.
bc – bursa copulatrix; et – eighth tergite; g – gut; ligular (eighth sternite); o – oviduct; s – spermatheca; sd – spermathecal duct; sg – spermathecal gland; st – styli; vag – vagina.

Fig. 40 General form of genus B.

Fig. 41 *Polysastra* sp. (*costatipennis*-group) illustrating general taxonomic characters.
ac – ad-lateral carina; mc – carinae formed by margins of depression; pas – post-antennal swellings; pd – pronotal depressions; sd – post-humeral sublateral depression.

microsculptured. Pronotum moderately convex, depressions shallow but distinct. *C*. 8·0–11·0 mm .... ***explanata*-group** (p. 226)

– Elytron with post-humeral sublateral longitudinal depression weak to absent, margins never forming ridges, lateral margin not explanate; elytron finely punctured, punctures either contiguous or not more than 1·5× their own width apart, majority of species with distinct micropuncturation on intervals.

Underside may have a supra-costal flange running parallel to epipleuron, or a preapical pit or depression which appears as a convexity on the dorsal surface. *C*. 7·5–14·0 mm .... ***micropunctata*-group** (p. 228)

4 (1) Elytron either irregularly convex with irregular puncturation or with the punctures situated around irregular non-punctate areas, which usually form distinct convexities or rugosities.

Outer margins of post-humeral sublateral longitudinal depression may or may not form carinae .... ***irregularis*-group** (part) (p. 227)

– Elytron more or less uniformly punctured throughout, puncturation fine to coarse, no rugosities or irregularities present 5

5 (4) Elytron with one or both margins of post-humeral sublateral longitudinal depression forming cariniform ridges, admedian carinae sometimes present 6

– Elytron with post-humeral sublateral longitudinal depression weak to absent, margins never forming distinct ridges or carinae 9

6 (5) Frons entirely depressed to concave.

Elytra often with a metallic lustre. *C*. 8·0–13·0 mm .... ***varia*-group** (p. 229)

– Frons triangular, medially convex or weakly to moderately convex, sometimes with a weak median depression, sides always elevated to some degree 7

7 (6) Elytron with both margins of post-humeral sublateral longitudinal depression forming cariniform ridges which are present from base of humeri to apical quarter, one or more entire or partial admedian carinae sometimes present 8

– Elytron with outer margin of post-humeral sublateral longitudinal depression forming a ridge, inner margin sometimes partially developed.

Elytron broadly rounded to pyriform; metallic or with a metallic or weakly metallic lustre; some species may have a slight crumpled appearance but puncturation more or less evenly distributed throughout. *C*. 10·5–14·0 mm .... ***metallica*-group** (p. 227)

8 (7) Frons weakly elevated or with a shallow median depression. Elytron somewhat unevenly convex, sometimes weakly rugose, puncturation dense throughout, punctures may form horizontal or oblique rows of *c*. 5–7 punctures, derm usually microsculptured, humeral area often with one or more partial carinae, derm non-metallic. Vertex and pronotum densely and coarsely punctured throughout. *C*. 9·0–15·0 mm ***irregularis*-group** (part) (p. 227)

– Frons triangular, medially convex. Elytron more or less evenly convex, puncturation more or less uniformly distributed throughout, admedian carina sometimes present, running parallel to sublateral carinae, derm often with a distinct metallic or submetallic lustre. Vertex and pronotum weakly and indistinctly to moderately punctured, punctures usually large and shallow. *C*. 8·0–11·0 mm .... ***costatipennis*-group** (p. 226)

9 (5) Elytron broadly rounded, sublateral post-humeral longitudinal depression almost absent; very strongly microsculptured, giving a dull appearance, punctures fine, tending to form irregular groups. *C*. 8·0–10·0 mm .... ***irregularis*-group** (part) (p. 227)

– Elytron not as above 10

10 (9) Pronotum broad and weakly convex, puncturation coarse and dense throughout, lateral tooth weakly developed and rounded, median depression joined by a shallow longitudinal narrow groove. Elytron strongly and densely punctured throughout, derm often with an aeneous lustre, post-humeral sublateral depression shallow. *C*. 10·0–13·0 mm ***abdominalis*-group** (p. 225)

– Pronotum not as above, tending to be elongated, lateral tooth rounded to subacute, punctures irregular, size fairly large and shallow, sometimes confluent in places. Elytra irregularly punctured, derm smooth and shining. *C*. 9·0–12·0 mm...... ***inhabilis*-group** (p. 226)

The *abdominalis*-group

Characterised principally by a broad, very weakly convex, strongly and densely punctured pronotum, which has a broad, rounded, weakly developed lateral tooth. Vertex coarsely and densely punctured

throughout, size of punctures as on pronotum. Frons forming a more or less evenly convex ridge. Elytron with a shallow post-humeral sublateral longitudinal depression. Puncturation strong and dense throughout, giving a slightly rugose appearance, punctures distinctly smaller than those on pronotum, not more than 1·3× their own width apart, derm smooth and shining, often with a weak submetallic lustre; setae minute, confined within margins of punctures, sometimes a few short, erect setae on intervals. Spermathecal form distinctive, differing from that in other groups by being narrow and distinctly elongated (Fig. 83). None of the aedeagal forms found in other groups has been found in this group. General colour dark green to brown, often with lighter coloured lateral margins to the elytron.

COMMENTS. The species representing this group and dealt with here is *abdominalis* (Figs 144, 145). A further six undescribed species that fall into this group have been examined.

The *bicostata*-group

Resembling the *obscuricornis*-group but distinguished by the distinctly setose elytra, finer puncturation and weakly developed margins of the post-humeral, sublateral longitudinal depression. Admedian carinae sometimes present.

COMMENTS. The species representing this group and dealt with here is *bicostata* (Fig. 149). A further two undescribed species have been examined.

The *costatipennis*-group

Characterised principally by having both margins of the post-humeral sublateral depression forming distinct cariniform ridges from the base of the humeri to the apical quarter, one or more additional admedian carinae sometimes present. Derm metallic or with a submetallic lustre. Puncturation fairly uniform throughout, fine to moderate, punctures not more than their own width apart, setae minute and confined within the margins of the punctures. Vertex and pronotum with fairly large, shallow, irregular punctures which may be confluent in places, derm usually smooth and shining. Pronotum weakly to moderately convex, depressions shallow, lateral tooth broad and weakly developed. Frons distinctly convex medially.

COMMENTS. Representative species dealt with here are *costatipennis, fuscitarsis, helleri, kampeni, laetabilis, obscuricornis, purpurasco* (Figs 120–126). A further four undescribed species belonging to this group have been examined.

The *explanata*-group

Distinctly setose dorsally, with all setae extending beyond margins of punctures. Vertex and pronotum with fine to granulate, dense puncturation throughout. Pronotum with broad, weakly developed lateral tooth. Elytron pubescent and very finely punctured throughout, punctures not more than half their own width apart, derm usually distinctly microsculptured. Outer margin of post-humeral sublateral longitudinal depression forming a distinct ridge, lateral margins somewhat explanate beyond the epipleura (more pronounced in female). Frons convex, elevation more or less equal to that of post-antennal swellings. Elytral coloration dull testaceous to dark reddish brown. Species with these external characteristics exhibit a similar type of aedeagus which predominates in the *costatipennis*-group.

COMMENTS. The species representing this group and dealt with here is *explanata* (Fig. 128). A further six undescribed species that fall into this group have been examined.

The *inhabilis*-group

Slender in form with distinct, irregular dorsal puncturation. Punctures on head and pronotum slightly larger than those on elytra, usually not more than twice their own width apart. Pronotum elongate, lateral tooth broad and weakly developed, derm smooth and shining, setae minute. Elytron with post-humeral sublateral longitudinal depression almost absent, outer margin sometimes forming a weakly developed ridge, particularly over humeri; punctures irregularly distributed, 1·0–1·5× their own width apart, derm smooth and shining, setae confined within margin of punctures. Testaceous to light reddish brown.

COMMENTS. The species dealt with here and representing this group is *inhabilis* (Fig. 143). A further five undescribed species have been examined.

The *irregularis*-group

Elytron strongly microsculptured, or uneven or rugose. Punctures in majority of species situated between irregular non-punctate areas which take the form of irregular, sinuate, elongate, confluent rugosities which may be smooth and shining or distinctly microsculptured. Setae confined within margins of punctures but some species, i.e. *confusa*, have long suberect setae on the intervals. Vertex and pronotum distinctly punctured, pronotal setae usually confined within margins of punctures.

COMMENTS. The majority of species that fall into this group may be further divided into subgroups by the additional characters detailed below. Examples of the *irregularis*-group dealt with here are *confusa* (Fig. 138), *duplicator* (Fig. 135), *irregularis* (Fig. 136), *sedlaceki* (Fig. 137), *rugulosa* (Fig. 140). A further 35 undescribed species of this group have been examined.

Subgroup 1

Elytron appearing distinctly rugose, non-punctate areas smooth and shining, derm usually with a distinct submetallic lustre, weakly developed partial carinae may be present on humeral area. Punctures situated in small groups of 2–5 between elevated areas which tend to be sinuate and confluent in places. Vertex and pronotum moderately punctured, pronotum convex with a well-developed lateral tooth which tends to be rounded, area around posterior primary setal pore often produced into a blunt 'tooth'. Frons tends to be very weakly convex or with a median depression and sinuate anterior margin. The species tend to range from reddish to bluish purple or bluish green or a combination of both, derm usually distinctly sub-metallic (Fig. 140).

Subgroup 2

Elytron with dense, moderate to coarse puncturation throughout, interspersed with mostly isolated, small, irregular, distinctly convex areas which tend to be slightly darker in colour than surrounding area. Irregular rows of long erect setae usually present, rest of setae minute. Vertex and pronotum coarsely and densely punctured throughout. Pronotum convex with a well-developed lateral tooth, usually with a subacute apex. Frons tending to form a more or less evenly elevated convex ridge. The species tend to be testaceous to reddish brown with an aeneous lustre (Figs 138, 139).

Subgroup 3

Elytron with weak to moderately developed, elongate, sinuate, confluent non-punctate areas which are moderately to strongly microsculptured, majority of punctures situated in groups between non-punctate areas, rest irregularly distributed. Vertex and pronotum with moderately dense, large, shallow well-defined punctures, derm usually microsculptured, pronotum usually weakly convex, lateral tooth well developed, often with an acute apex. Frons moderately convex to somewhat flattened dorsally. The species tend to be dull and darkly coloured, non-metallic (Figs 135, 136, 137).

Subgroup 4

Elytron unevenly convex, often with rugosities, puncturation irregular, derm often distinctly microsculptured. Margins of post-humeral, sublateral longitudinal depression forming cariniform ridges, one or more partial carinae may also be present on humeral area. Vertex and pronotum distinctly punctured, punctures sometimes coarse and confluent in some species (Figs 141, 150).

Subgroup 5

Elytron more or less evenly convex, derm very strongly microsculptured, puncturation fine, usually with a weak indication of grouping. Vertex and pronotum with distinct, large, shallow, usually non-confluent punctures. Usually small, black to dark green species with broadly rounded elytra (Fig. 142).

The *metallica*-group

Elytron distinctly metallic or with a metallic lustre; broadly rounded to pyriform, outer margin of post-humeral sublateral longitudinal depression forming a distinct ridge, inner margin sometimes partially developed. Dorsal setae minute, confined within margins of punctures, giving a glabrous appearance.

Pronotum with lateral tooth broad, weakly developed. Frons medially convex. The group can be further divided into three subgroups based on the additional characters detailed below.

COMMENTS. The species representing this group and dealt with here are *metallica*, *suavis*. A further seven undescribed species have been examined.

Subgroup 1

Elytron distinctly metallic with fine to moderate puncturation throughout, surface sometimes slightly uneven, giving a weakly crumpled appearance, outer margin of post-humeral sublateral longitudinal depression forming an irregular, weakly sinuate ridge, inner margin sometimes partially developed. Vertex and pronotum smooth and shining with fairly large, shallow, sparse to moderately dense puncturation. Elytron deep metallic green/blue or dark purplish blue (Fig. 132).

Subgroup 2

Elytron submetallic or with a strong metallic lustre, puncturation moderate to coarse throughout, giving a slight rugose appearance in some species, ridge formed by outer margin of sublateral depression sinuate. Vertex and pronotum with large coarse punctures which may be confluent in places, pronotum narrow, depressions distinct, lateral tooth sometimes slightly more acute than in group 1. Elytron dark brownish green to purplish brown with a dark green or purplish lustre (Fig. 133).

Subgroup 3

Elytron with a metallic lustre, puncturation strong and dense throughout, surface more or less even throughout. Pronotum broad, weakly convex; outer margin of post-humeral sublateral depression forming a well-developed, more or less straight cariniform ridge. Elytron dark brownish green with an aeneous lustre or bright green/blue (Fig. 134).

The *micropunctata*-group

Characterised by the distinct, fine, dense elytral setae that extend beyond margins of punctures and the presence of micropuncturation on the intervals between the regular elytral puncturation (subgroup 3). Post-humeral sublateral depressions absent, elytron evenly convex, puncturation fine and more or less uniform throughout. Vertex and pronotum densely punctured throughout, sometimes granulate, setae fine and distinct. Pronotum with a well-developed lateral tooth, usually with acute apices. Some species may have a distinct supracostal flange running parallel to the epipleura on the underside of the elytron, e.g. *micropunctatus* (Fig. 130), or a preapical pit-like depression; both may appear as a ridge or convexity on the upper surface of the apical quarter. This group divides into three principal subgroups based on the additional characters detailed below.

COMMENTS. The species representing this group and dealt with here are *montana* (Fig. 129) and *micropunctata*. A further nine undescribed species have been examined.

Subgroup 1

Vertex and pronotum with fine to granulate puncturation, setae long, fine and appressed. Pronotum often with two small admedian and adlateral convexities, lateral tooth well developed, apices subacute to acute. Elytron with very fine regular puncturation, punctures 0·5–1·5× their own width apart, intervals with distinct micropunctures from which the majority of the setae arise, setae short, fine and appressed, extending well beyond margins of punctures. Sometimes a supracostal flange or preapical depression on underside of elytron. Dull, black to reddish brown species.

Subgroup 2

Vertex and pronotum irregularly and densely punctured throughout, puncturation confluent, never fine and granulate as above. Setae long and appressed. Pronotum somewhat flattened and elongated, lateral tooth large and acute, wholly in anterior half, lateral margin between base of tooth and posterior primary setal pore more or less straight, derm with a slight vitreous lustre, setae long and appressed. Elytron with slightly larger and less dense puncturation than in subgroup 1, micropuncturation slightly less distinct due to surface reflection, setae very fine and appressed. The species tend to be elongate and slender with almost parallel-sided elytra, mostly pale testaceous to light reddish brown.

Subgroup 3

Vertex and pronotum as in subgroup 1, but elytron with fine contiguous puncturation throughout, micropuncturation almost absent due to density of regular punctures.

The *varia*-group

Very similar in appearance to the *obscuricornis*-group, but separated by the following characters. Frons entirely depressed, weakly concave in some species. Carinae formed by margins of post-humeral, sublateral longitudinal depression never joined at base of humeri, sometimes linked by an irregular, oblique convexity at around level of hind coxae, this convexity may also link ad-median carina to adjacent carina. Colour range variable as in the *costatipennis*-group.

COMMENTS. The species representing this group and dealt with here are *varia* (Figs 146–148) and *venusta* (Fig. 127). A further three undescribed species have been examined.

Key to described species and subspecies of *Polysastra*

[Further undescribed species are referred to in the text.]

1 Elytron distinctly pubescent throughout, all setae extending well beyond diameter of punctures. Puncturation more or less uniform throughout, derm never rugose 2

– Elytron not pubescent, majority of setae minute, confined within margins of punctures, sparse erect setae sometimes present on intervals, puncturation irregular or uniform, derm rugose or costate 5

2 (1) Pronotal puncturation fine to granulate throughout, setae distinct. Elytron evenly convex, post-humeral sublateral longitudinal depression indistinct or absent 4

– Pronotal puncturation not as above. Elytron with a distinct post-humeral sublateral longitudinal depression, the outer margin of which forms a distinct ridge 3

3 (2) Elytron pale reddish brown with an overall light metallic green lustre. Head, pronotum and scutellum testaceous to light orange-yellow. Underside and legs testaceous. Vertex and pronotum irregularly punctured with large, shallow, mostly non-confluent punctures. Pronotal depressions well defined. Lateral margin of elytron not explanate beyond epipleura, setae not dense. Length 9·0–11·0 mm. (Fig. 149.) Genitalia as in Fig. 62. (Map 2.) .... ***bicostata*** (p. 232)

– Elytron dull orange to deep reddish brown, pronotum normally slightly lighter in colour. Head either concolorous with pronotum or dark as in elytron. Underside and legs testaceous to light orange-brown. Vertex, pronotum and scutellum with dense confluent punctures throughout. Lateral margin of elytron somewhat explanate beyond epipleura, setae dense. Length 9·5–12·0 mm. (Fig. 128.) Genitalia as in Figs 51, 84. (Map 3.)
explanata (p. 233)

4 (2) Underside of elytron with a distinct supracostal flange running parallel to epipleuron from base to apical quarter where it joins sutural margin above apex. Dorsum dark reddish to pitchy brown, lateral margin of elytron reddish orange, distinctly lighter than rest of elytron. Length 10·5–11·5 mm. (Fig. 130.) Genitalia as in Figs 52, 85. (Map 3.)
micropunctata (p. 238)

– Underside of elytron without a supracostal flange but with a small, distinct ovate pit just prior to apex. Dorsum dull yellow to light reddish brown. Head and pronotum slightly darker in colour than elytron. Metasternum often distinctly darker in colour than rest of underside. Length 10·0–13·0 mm. (Fig. 129.) Genitalia as in Figs 53, 86. (Map 3.)
montana (p. 239)

5 (1) Surface of elytron uneven with irregular smooth usually non-punctate raised areas or rugosities which are often distinctly microsculptured. Head and pronotum with large irregular punctures 6

– Surface of elytron without such raised areas, puncturation more or less uniform throughout 10

6 (5) Length 6·9–9·0 mm. Dorsum dark yellowish to orange-brown. Elytron usually slightly lighter in colour than pronotum, with a golden to pinkish lustre. Pronotum *c.* 1·6× broader than long. Vertex, including post-antennal swellings, and pronotum with

large coarse confluent puncturation. Elytron with irregular longitudinal rows of long sparse setae. (Fig. 138.) Genitalia as in Figs 68, 96. (Map 3.) .... **confusa** (p. 232)

– Length 10·0–15·0 mm. Coloration not as above, pronotal punctures not confluent throughout. Other characters not so combined 7

7 (6) Length 8·5 mm. Elytron pale reddish pink with a slight purplish lustre. Metasternum and tibiae dark pitchy brown. Rest of body pale testaceous. (Fig. 140.) .... **rugulosa** (p. 241)

– Length 10·0–15·0 mm. Coloration not as above 8

8 (7) Length 11·0–15·0 mm. Pronotum at least 2·0× broader than long. Dorsum dark orange-brown to pitchy black. Elytron may have a faint purplish lustre and pale lateral margins. (Fig. 137.) Genitalia as in Figs 64, 95. (Map 7.) .... **sedlaceki** (p. 242)

– Length 10·0–11·5 mm. Pronotum not more than 1·8× broader than long. Elytron dark purplish to reddish brown. Head and pronotum pitchy brown to black 9

9 (8) Femora except for apices distinctly lighter in colour than rest of legs. Derm between humeri and sutural margin of elytron somewhat rugose and uneven. (Fig. 136.) Genitalia as in Figs 66–67, 93. (Map 5.) .... **irregularis** (p. 236)

– Femora concolorous with tibiae, deep reddish to pitchy brown. Derm between humeri and sutural margin of elytron not rugose. (Fig. 135.) Genitalia as in Figs 65, 94. (Map 3.) .... **duplicator** (p. 233)

10 (5) Frons convex, general elevation equal to or exceeding that of post-antennal swellings. Elytron with or without carinae. 12

– Frons entirely depressed, general elevation less than that of post-antennal swellings. Elytron carinate 11

11 (10) Elytron light orange to deep reddish brown, often with a strong, dark green lustre on humeral area and over longitudinal sublateral depression. Head and pronotum testaceous to light brownish red. Margins of post-humeral sublateral longitudinal depression forming carinae which are joined at base of humeri, a third weakly developed carina also present (more distinct in ♀) and running more or less parallel to inner carina, beginning at base of humeral area and becoming obsolete in apical quarter at about same level as termination of inner carina. Length 8·0–10·0 mm. (Fig. 127.) Genitalia as in Fig. 6. (Map 5.) .... **venusta** (p. 245)

– Coloration variable, elytron light reddish brown to deep purplish blue or varying shades of dark green. Pronotum testaceous to reddish orange or black. Margins of post-humeral sublateral longitudinal depression forming carinae, not joined at base of humeri, a third indistinct irregular carina also present and linked to inner carina of depression by an oblique irregular convexity just below humeral area. All longitudinal carina becoming obsolete in apical quarter. Length 7·0–12·0 mm. (Figs 146, 147, 148.) Genitalia as in Figs 58–60, 100, 101. (Map 6.) .... **varia** (p. 243)

12 (10) Elytron not carinate, puncturation irregular, derm weakly rugose, dark testaceous or green to pitchy brown 13

– Elytron carinate, with fine regular puncturation, strong metallic blue/green 14

13 (12) Elytron dull greenish to pitchy brown, lateral margins normally lighter, derm weakly rugose, puncturation more or less evenly distributed throughout. Head and pronotum testaceous to light yellowish brown. Pronotum with dense coarse puncturation, derm microsculptured. Scutellum triangular, apex acute. Length 7·5–12·0 mm. (Figs 144, 145.) Genitalia as in Figs 50, 83. (Map 4.) .... **abdominalis** (p. 232)

– Body except for head opaque testaceous to light orange-brown, elytron often with irregular pigmentation. Head normally darker in colour than pronotum. Pronotum with large non-confluent punctures, derm smooth and shining. Scutellum distinctly longer than broad, apex truncate. Length 7·5–11·0 mm. (Fig. 143.) Genitalia as in Figs 63, 97. (Map 3.) .... **inhabilis** (p. 235)

14 (12) Elytron with margins of post-humeral sublateral longitudinal depression forming carinae which are joined at base of humeri, a weakly developed admedian carina may also be present, running parallel to inner carina, derm often with a submetallic lustre 16

– Elytron with only the outer margin of the post-humeral sublateral longitudinal depression forming a carina or ridge, inner margin sometimes partially developed but never joined to outer, derm deep metallic blue or green.

Head, pronotum, scutellum and metasternites either dark orange to reddish brown or black 15

15 (14) Elytron almost pyriform, bright metallic blue or green, outer margin of sublateral

longitudinal depression forming an irregularly developed ridge, inner margin only partially developed, sinuate. Pronotum *c.* 1·8× broader than long with small indistinct punctures 1·5–2·0× their own width apart. Metepisternum microsculptured, punctures minute, 2·5–3·0× their own width apart. Median area of vertex raised and impunctate. Length 9·5–13·0 mm. (Fig. 131.) Genitalia as in Figs 54, 98. (Map 7.) **suavis** (p. 243)

– Elytron subparallel-sided, dark metallic green, lateral margin often with bluish or purplish lustre, outer margin of post-humeral sublateral depression forming a distinct, well-developed, more or less straight ridge, inner margin indicated by a short indistinct sinuate ridge. Pronotum at least 1·95× broader than long, punctures mostly situated along anterior margin and in lateral area of depressions. Metapisternum strongly microsculptured, punctures minute, indistinct due to microsculpture. Vertex irregularly punctured. Length 9·5–13·0 mm. (Fig. 132.) Genitalia as in Figs 55–57, 99. (Map 7.) .... **metallica** (p. 238)

16 (14) Elytron dark submetallic green or brownish green, sometimes with distinctly lighter lateral margins, but never lighter sutural margin. Pronotum testaceous to light orange-brown. Head with vertex reddish to pitchy brown or concolorous with pronotum 17

– Coloration not as above 19

17 (16) At least three-quarters of lateral area of elytron, from outer margin of post-humeral sublateral longitudinal depression to lateral margin, light reddish brown. Tibiae and apices of femora pitchy brown. N. Australia, D'Entrecasteaux Islands........ 18

– Elytron entirely dark metallic green. Legs unicolorous.
Head and pronotum testaceous to light reddish brown. Length 8·5–10·5 mm. (Fig. 123.) Genitalia as in Fig. 70. (Map 2.)........ **laetabilis** (p. 237)

18 (17) Anterior area of head including post-antennal swellings testaceous, usually concolorous with pronotum, vertex deep reddish brown. Lateral area of elytron entirely red to reddish brown. Third admedian carina beginning at level equal to that of apex of scutellum, present to apical quarter. Length 8·5–11·0 mm. (Fig. 121.) Genitalia as in Figs 71, 87. (Map 8.) .... **obscuricornis** (p. 239)

– Head entirely dark reddish brown. Lateral margin of elytron reddish brown from level equal to that of apex of metepisternum to apices. Third ad-median carina present from level equal to that of base of humeri where lateral carinae join, to apical quarter. Length 7·0–10·5 mm. (Fig. 125.) Genitalia as in Figs 74, 91. (Map 2.) **purpurasco viridis** (p. 241)

19 (16) Elytron light orange to reddish brown with a distinct, submetallic dark green longitudinal band extending from humeral area to apical quarter, basal quarter sometimes entirely dark green. Head anterior to post-antennal swellings, pronotum, scutellum, underside and femora opaque, testaceous; rest of head, antennae, tibiae and tarsi deep reddish to pitchy brown. Frons broadly triangular, not strongly convex. Elytral puncturation never coarse or confluent. Length 6·9–10·0 mm. (Fig. 120.) Genitalia as in Figs 72, 88. (Map 2.) .... **costatipennis** (p. 233)

– Coloration not as above. Frons convex, usually with a horizontal median keel 20

20 (19) Elytron light orange to dark reddish brown with a distinct, pale submetallic pinkish lustre which sometimes has a greenish reflection, lateral margins often lighter in colour than rest of elytron. Pronotum, scutellum and underside testaceous to pale orange-yellow, rest of body dark reddish brown, underside of femora often lighter in colour than rest of legs. Length 8·9–12·5 mm. (Fig. 126.) Genitalia as in Figs 69, 95. (Map 2.) .... **fuscitarsis** (p. 234)

– Elytron reddish purple to deep bluish purple, sometimes with a bright bluish green lustre on humeral area (in deep purple specimens this tends to extend over the whole elytron). Head and pronotum concolorous, testaceous to purplish red. Tibiae normally darker in colour than femora. Teneral specimens orange to dull reddish brown with a slight green or purplish lustre 21

21 (20) Elytron strongly or coarsely punctured, punctures sometimes confluent in places, particularly on humeral area, admedian carina well developed in basal half. Head, pronotum, scutellum, underside and legs either concolorous testaceous, or head, pronotum and scutellum red with antenna and tibiae dark reddish to pitchy brown,

underside brownish orange. Elytron orange-brown to deep purplish red with a green submetallic lustre over humeral area and often extending over sublateral depressions (deep purple specimens have the dark green lustre extending over whole elytron). Teneral specimens orange to dull reddish brown with a slight green or purple lustre. Length 7·5–10·5 mm. (Fig. 122.) Genitalia as in Figs 75–76, 89. (Map 4.) ..... ***helleri*** (p. 235)

– Elytron never coarsely punctured, punctures never confluent, on average 1·0–1·5× their own width apart, admedian carina not always well developed. Head, pronotum and scutellum testaceous to light orange-yellow, underside testaceous to light orange-brown. Antenna and tibiae dark reddish brown or testaceous to light reddish brown. Elytron light purplish pink to deep reddish purple with a purplish blue or greenish blue lustre. Teneral specimens with elytron light orange-brown with a light green or purplish lustre. Length 8·0–11·0 mm. (Fig. 124.) Genitalia as in Figs 73, 90. (Map 2). ***purpurasco purpurasco*** (p. 240)

Polysastra abdominalis (Jacoby) **comb. n.**

(Figs 50, 83, 144, 145, Map 4)

Sastra abdominalis Jacoby, 1904: 503. Syntype ♂, PAPUA NEW GUINEA: Moroka, 1300 m, vii–xi. [18]93 (*Loria*) (BMNH) [examined].

ADDITIONAL MATERIAL EXAMINED

Papua New Guinea: 112 ex., various localities (see Map 4) (AMNH, BMNH, IP, OIP, RWH, SAM).

COMMENTS. This species is representative of the *abdominalis*-group but it is not closely related to any of the taxa described here. All the undescribed species of the abdominalis-group examined are very similar in appearance, so care should be taken to check the genitalia of any specimen that is assigned to this species.

Polysastra bicostata (Jacoby) **comb. n.**

(Figs 62, 149, Map 2)

Sastra bicostata Jacoby, 1894: 305. LECTOTYPE ♂, IRIAN JAYA: Andai, 1892 (*W. Doherty*) (MCZ), here designated [examined].

ADDITIONAL MATERIAL EXAMINED

Irian Jaya: 1 ♀, Dor[ey] (*Wallace*) (BMNH).

COMMENTS. This species is representative of the *bicostata*-group. It is similar in appearance to species of the *costatipennis*-group but may be distinguished by the distinct elytral setae.

Polysastra confusa **sp. n.**

(Figs 68, 96, 138, Map 3)

GENERAL FORM. Length 6·9–9·0 mm. Elytra subparallel-sided; post-humeral sublateral depression absent, outer margin present as an irregular broken ridge, well developed on humeri in ♀, surface of elytron with irregular smooth raised areas throughout, areas between these rugosities strongly punctured, majority of setae on elytron confined within margins of punctures, rest very long, fine and erect, forming irregular longitudinal rows on interspaces. Head dark orange-brown, pronotum and scutellum either concolorous with head or slightly lighter in colour; elytron either concolorous with pronotum or deeper, more reddish brown, raised areas usually slightly darker in colour than rest of derm; underside unicolorous testaceous or metasternum deep orange to reddish brown, basal three-quarters of femora testaceous, apical area dark orange to reddish brown, tibiae and tarsi either concolorous with apices of femora or slightly lighter in colour, setae translucent or pale golden.

DIAGNOSIS. Head with frons more or less evenly convex, elevation less than that of post-antennal swellings; post-antennal swellings distinctly elevated above vertex, hind margins ill-defined due to coarse punctuation; vertex with large, irregular, coarse, confluent punctures, derm strongly microsculptured, setae very fine. Antenna with long fine suberect setae. Pronotum transverse, *c.* 1·6× as broad as long, lateral tooth acute, wholly in anterior half and apices inclining towards anterior margin, width across tooth 1·1× greater

than at its base, dorsal depressions ill-defined due to coarse puncturation. Puncturation coarse and confluent throughout, punctures similar in size to those on vertex, setae very fine and suberect. Scutellum triangular, apex subtruncate, length more or less equal to maximum width, punctures irregular, smaller and shallower than those on pronotum but distinctly coarser than those on adjacent area of elytron; setae fine and adpressed. Elytron *c.* 3·4× as broad as long, width increasing gradually from humeral angles to a maximum at around apical quarter, maximum width 1·3× greater than that at apex of scutellum, apices evenly rounded, area between irregular raised areas strongly punctured, punctures on average not more than their own width apart, those on humeral area slightly larger and denser than rest, but smaller and less coarse than those on pronotum, derm with a vitreous lustre. Underside finely and minutely punctured throughout. Metepisternum somewhat granulate, derm strongly microsculptured; punctures on metasternum 2–3× their own width apart, becoming slightly denser and irregular along lateral margins, derm smooth and shining, weakly microreticulate along lateral margins, setae on disc long, fine and suberect, becoming slightly shorter towards sides; abdomen indistinctly punctured, punctures 3–4× their own width apart, becoming slightly irregular and denser at sides, derm smooth, weakly microsculptured at sides, setae as on metasternum; femora finely punctured, punctures slightly larger and shallower than those on metasternum, 3–4× their own width apart, becoming denser at apices, microsculpture becoming stronger towards apices; tibiae finely granulate, setae shorter and more erect than on femora. Genitalia (Figs 68, 96).

Holotype ♂ (dissected), **Papua New Guinea**: Bulldog Road, *c.* 14 km S. Edie Creek, 1405 m, 4–10.vii.1966, light-trap (*G. A. Samuelson*) (BPBM).

Paratypes. **Papua New Guinea**: 1 ♀, same data as holotype; 1 ♀, Wau, 2400 m, 9–12.i.1962 (*J. Sedlacek*) (BMNH, BPBM).

COMMENTS. This species belongs to the *irregularis*-group. Care must be taken not to confuse it with an undescribed species from the same area that has similar facies, and a strongly microsculptured pronotum with weaker non-confluent puncturation than in *confusa*; the ♀ is without the ridge on the elytral humerus (Fig. 139).

Polysastra costatipennis (Jacoby) comb. n.

(Figs 72, 88, 120, Map 2)

Sastra costatipennis Jacoby, 1886: 73. LECTOTYPE ♂, PAPUA NEW GUINEA: Fly River, 1876–77 (*L. M. D'Albertis*) (MCZ), here designated [examined].

ADDITIONAL MATERIAL EXAMINED

Papua New Guinea: 1 ♂, 5 ♀ (paralectotypes), same data as lectotype (BMNH, MCZ); 1 ♀, between Port Moresby and Brown River, 30 m, 29.x–1–xi.1965 (*J. Sedlacek*) (BPBM).

COMMENTS. This species is representative of the *costatipennis*-group and is most similar in appearance to *obscuricornis*.

Polysastra duplicator sp. n.

(Figs 65, 94, 135, Map 3)

Length 9·5–12·2 mm. Externally very similar to *irregularis*. The only distinct difference is in the coloration of the legs which, in *duplicator*, are unicolorous dark reddish. In comparison with *irregularis, duplicator* has a less coarsely punctured pronotum and the elytron is not so rugose. The two species can be easily separated by the genitalia characters (Figs 65, 94).

Holotype ♂, **Irian Jaya**: Star Range, 2360 m, bivak 40, 21.vii.1959 (*Neth. New Guinea Exp.*) (RNH).

Paratypes. **Irian Jaya**: 3 ♂, 7 ♀, same data as holotype (2 ♂, 1 ♀ BMNH); 4 ♂, 3 ♀ same data as holotype except 22.vii.1939 (1 ♂, 1 ♀ BMNH); 2 ♂, same data as holotype except 18.vii., 20.vii.; 3 ♀, same data as holotype except bivak 39a, 20.vi., 12.vii. and 23.vii.; 5 ♂, 9 ♀, Paniai, 22.viii.–17.ix.1939 (2 ♂, 2 ♀ BMNH); 1 ♂, Dejeresa, 31.ix.1939. (All RNH unless otherwise stated.)

Polysastra explanata sp. n.

(Figs 51, 84, 128, Map 3)

GENERAL FORM. Length 9·5–12·0 mm. Elytra subovate, setose, setae extending beyond margins of punctures, lateral margins explanate, puncturation more or less uniform throughout, post-humeral

longitudinal sublateral depression almost absent but outer margin forming a well-developed ridge which begins at base of elytron, extends over humerus and continues more or less straight to apical quarter, apex evenly rounded; vertex, pronotum and scutellum coarsely and confluently punctured throughout. Head, pronotum and scutellum concolorous testaceous to dark orange-brown; elytron light orange-brown to dark reddish brown with a very weak, deep purplish lustre; underside testaceous to light orange-brown, femora concolorous with underside or slightly darker, apices often dark pitchy brown, tibiae, tarsi and antennal segments dark reddish brown; setae pale golden.

Diagnosis. Head with frons convex, maximum elevation more or less equal to that of post-antennal swellings, post-antennal swellings microsculptured, vertex punctured throughout, punctures confluent, more or less equal in size to largest on pronotum, setae long and fine, adpressed. Pronotum transverse, on average 1·8× as broad as long, lateral margins with a broad, weakly developed tooth, width across tooth *c.* 1·1× greater than minimum posterior width, dorsal depressions distinct, puncturation coarse and confluent throughout, derm strongly microsculptured, setae long, fine and suberect. Scutellum finely punctured and strongly microsculptured, setae as on pronotum. Elytron becoming broader and lateral margin becoming explanate from humeral angle to apical quarter, maximum width *c.* 1·3× (♂) and 1·5× (♀) greater than width at apex of scutellum, median area of basal quarter moderately convex with a small, round shallow depression at base of scutellum; puncturation fine and uniform throughout, punctures not more than their own width apart, size more or less equal to smallest on pronotum, derm finely microsculptured; setae shorter and somewhat stouter than those on pronotum. Underside finely and minutely punctured throughout. Punctures on disc of metasternum 3–4× their own width apart, derm weakly microsculptured, setae on disc shorter and finer than those at margins, puncturation of abdomen similar to that of metasternum, setae becoming longer towards middle and sides of segments. Legs with basal three-quarters of femora finely punctured, punctures 1·0–1·5× their own width apart, apical quarter granulate, setae long, fine and adpressed; tibiae granulate, setae short and stout, becoming denser towards apices. Wing fully developed. Genitalia as in Figs 51, 84.

Holotype ♂, **Papua New Guinea**: Kokoda, viii.1933, lower rain forest, 1300 ft (*L. E. Cheesman*) (BMNH).

Paratypes. **Papua New Guinea**: 2 ♂, same data as holotype; 3 ♂, 3 ♀, Kokoda, 1200 ft, vi–viii.1933 (*L. E. Cheesman*); 1 ♂, Maprik, 24.x.1957 (*J. Smart*) (BMNH); 1 ♂, Wau, Morobe District, 1200 m, 25.xii.1961 (*G. Monteith & J. Sedlacek*); 1 ♀, Bulolo Vatus, 700–800 m, 1–7.vi.1969 (*J. Sedlacek*); 2 ♀, Kokoda-Pitoki, 450 m, 25.iii.1956 (*J. L. Gressitt*); 5 ♀, Tsenga 1200 m, Upper Jimmi V, 15.vii., 13.viii., 14.viii.1955 (*J. L. Gressitt*) (1 ♂, 2 ♀ BMNH; 2 ♂, 3 ♀ BMNH).

Comments. This species is representative of the *explanata*-group. It does not bear any close affinity to the other *Polysastra* species described here. Three undescribed species which closely resemble this species and belong to this group have been examined, so care should be taken to check the genitalia of specimens when assigning them to this species.

Polysastra fuscitarsis sp. n.

(Figs 69, 95, 126, Map 2)

General form. Length 8·1–12.1 mm. Elytra subparallel-sided, outer margins of post-humeral, sublateral longitudinal, depressions forming distinct cariniform ridges which are joined at the base of the humeral angle; a longitudinal admedian carina is also weakly indicated running parallel to inner ridge. Puncturation of elytron uniform and dense, setae confined within margins of punctures. Head and pronotum distinctly punctured. Head either entirely dark reddish to yellowish brown, or with area anterior to post-antennal swellings distinctly lighter in colour than vertex. Pronotum and scutellum testaceous to orange-brown. Elytron light orange to reddish brown with a submetallic, pale purplish pink lustre which is often dark green over humeri in mature specimens. Underside testaceous to light orange-brown. Legs either entirely dark orange to reddish brown, or femora testaceous with dark apices, tarsi normally darker brown than tibiae. Setae pale golden. Fully winged.

Diagnosis. Head with frons triangular and medially convex, weakly declivous anteriorly, maximum elevation slightly greater than that of post-antennal swellings; post-antennal swellings well defined, elevated above level of vertex, hind margins oblique, lateral margins distinctly separated from inner margins of eyes by a shallow groove, derm smooth and shining, sparsely punctured. Vertex irregularly punctured with groups of ill-defined, often confluent, shallow punctures, derm around punctures irregularly depressed and weakly microreticulate, rest of derm smooth and shining, setae very fine, small and adpressed. Pronotum transverse, on average 2·1× broader than long, lateral tooth well developed, apex

subtruncate, width at tooth on average 1·2× greater than minimum posterior width; lateral depressions shallow and ill-defined due to lateral declivity of pronotum, median depressions shallow but distinct, puncturation irregular, greatest density at sides where they may be contiguous or confluent, size variable, largest more or less equal to largest on vertex, derm smooth and shining, weakly microsculptured in strongly punctured areas, setae minute, fine and adpressed, those at sides confined within margins of punctures. Scutellum slightly longer than broad, apex subtruncate, weakly convex medially, sparsely and finely punctured, derm weakly microreticulate, setae short, fine and adpressed. Elytron *c.* 3·0× longer than broad, width increasing gradually from base of humeri to a maximum around middle which is 1·2× greater than width at apex of scutellum; outer margin of post-humeral sublateral longitudinal depression forming a distinct ridge, extending from base of elytron over humerus to apical quarter where it becomes obsolete, inner margin also forming a ridge which is joined to the outer at the base of the humeral angle and continues to apical quarter where it becomes obsolete just above termination of outer margin, an admedian longitudinal ridge also present, running parallel to inner ridge of depression, which is often indistinct or obsolete for parts of its length. Puncturation more or less uniform throughout, punctures 2·0–2·5× their own width apart, their size less than half that of lateral pronotal punctures, derm smooth and shining, weakly microreticulate in basal half, epipleura becoming obsolete about middle of apical quarter, anterior half with a shallow median groove. Underside finely and densely punctured throughout, punctures on disc of metasternum 3–4× their own width apart, becoming denser at sides, derm weakly microreticulate at sides; metepisternum densely microsculptured, punctures 1·0–1·5× their own width apart, setae long and fine on disc, becoming shorter and adpressed at sides. Abdomen finely punctured throughout, punctures 5–6× their own width apart, setae long and suberect, stouter than those on metasternum, derm smooth and shining, femora finely punctured, punctures on basal three-quarters 3·0–3·5× their own width apart, increasing in density to 0·5–1·0× width apart at apices, derm weakly microsculptured at apices, setae long, fine and adpressed, tibiae finely and densely punctured, becoming granulate towards apices, setae becoming shorter, stouter and more erect towards apices. Genitalia as in Figs 69, 95.

Holotype ♂, **Irian Jaya**: Bernhard camp, 50 m, vii–xi.1939 (*J. Olthof*) (Neth. Ind.-Amer. New Guinea Exped.) (BPBM).

Paratypes. **Irian Jaya**: 15 ♂, 44 ♀, same data as holotype (7 ♂, 20 ♀ BMNH); 3 ♂, 4 ♀, Iebele camp, 2250 m, xi.1938 (*L. J. Toxopeus*); 1 ♀, Idenburgh River, 400 m, 15.vii.–15.xi.1938 (*J. Olthof*); 1 ♀, letterbox camp, 3600 m, 27.ix.1938 (*L. J. Toxopeus*) (BPBM unless otherwise stated).

Non-paratypic material. 12 specimens, same data as holotype (BPBM).

Comments. *P. fuscitarsis* belongs to the *costatipennis*-group. The species described here to which it bears the closest affinity is *purpurasco*.

Polysastra helleri (Weise) comb. n.

(Figs 75, 76, 89, 122, Map 4)

Sastra helleri Weise, 1917: 207. LECTOTYPE ♀, Papua New Guinea: Toricelli Mts, i.1910 (*Schlaginhaufen*) (SMT), here designated [examined].

Additional material examined

Papua New Guinea: 1 ♂, 5 ♀ (paralectotypes), same data as lectotype (1 ♂, 3 ♀ SMT; 2 ♀ NR). **Irian Jaya, Papua New Guinea**: 6 ♂, 11 ♀, various localities (Map 4) (BMNH, BPBM, MCZ, NR, RHW, SMT).

Comments. This species belongs to the *costatipennis*-group. Of the species dealt with here, it is closest to *laetabilis*.

Polysastra inhabilis sp. n.

(Figs 63, 97, 143, Map 3)

General form. Length 7·5–11·0 mm. Elytra subparallel-sided, post-humeral sublateral depressions almost absent, outer margins forming weak ridges which are distinct over humeri in ♀, surface of elytron irregularly but uniformly punctured, very weakly rugose, setae minute, hardly extending beyond margins of punctures. Head and pronotum distinctly punctured. Head and pronotum either concolorous testaceous to dull reddish brown or with head distinctly darker in colour than pronotum. Elytron opaque testaceous to dull brownish yellow, basal sutural angle may be dark reddish brown; derm with a weak vitreous lustre in basal half. Underside testaceous to dull brownish yellow. Legs pale testaceous, apex of femora often dark reddish brown, setae pale golden. Fully winged.

Diagnosis. Head with broad triangular frons, slightly flattened dorsally, elevation less than that of post-antennal swellings, interantennal groove deep; post-antennal swellings strongly convex and elevated above level of vertex, hind margins rounded, sometimes ill-defined due to strong puncturation of vertex, lateral margins of swellings delimited by a narrow groove, surface irregularly punctured; vertex with strong, coarse, irregular puncturation which is particularly dense and often confluent behind post antennal swellings, punctures on centre of vertex often elongated, size variable, largest punctures more or less equal to largest on pronotum; derm shining, weakly microsculptured in areas of strong puncturation; median 'suture' almost absent; setae short and fine, adpressed or suberect. Pronotum transverse, *c.* 1·9× broader than long, lateral tooth broad, moderately well defined but often unevenly developed, width at tooth 1·2× greater than minimum posterior width; sublateral depression weak and ill-defined, median depressions distinct, anterior depression de-limited behind by two small adjacent convexities; surface distinctly punctured throughout, puncturation irregular, punctures *c.* 0·5–1·0× their own width apart, contiguous in places, in size more or less equal to those on vertex; derm smooth and shining; setae minute and adpressed. Scutellum 1·4× longer than broad, derm with small shallow punctures, setae short and adpressed. Elytron *c.* 4·5× longer than broad, width increasing gradually from below humeral angles to a maximum just below mid line, maximum width 1·2× greater than that at apex of scutellum; puncturation irregular, size more or less uniform throughout, punctures small and deep, less than half size of those on pronotum, tending to form small, horizontal oblique groups of *c.* five punctures separated from one another by not more than their own width; interspaces very weakly convex, giving a slight rugose appearance; setae minute, only just extending beyond margin of punctures; those in vestigial striae indistinct, sparse, short and decumbent. Epipleuron narrow, not becoming completely reflexed until apical quarter where it becomes obsolete. Underside finely and densely punctured throughout, disc of metasternum almost impunctate, width between punctures decreasing from 4–5× width of a puncture to less than 2× at sides of metasternum; derm becoming microsculptured towards sides; setae long and erect on disc, short and decumbent at sides, metepisternum very finely and densely punctured, derm strongly microsculptured, setae adpressed, punctures on abdominal segments fine and shallow, 1·5–2·0× their own width apart, sometimes ill-defined due to strong microsculpture on derm; setae long, fine and subadpressed, length decreasing slightly towards sides. Femora finely and sparsely punctured, punctures 3–6× their own width apart; derm microsculptured; setae long fine and adpressed, becoming shorter at apices. Tibiae finely and densely punctured, punctures 0·5–1·0× their own width apart, setae short, dense and stout. Genitalia as in Figs 63, 97.

Holotype ♂, **Irian Jaya**: Lake Habbema, 3250–3300 m, vii–viii.1938 (*L. J. Toxopeus*) (Neth. Ind.-Amer. New Guinea Exp. 1938) (BPBM).

Paratypes. **Irian Jaya**: 3 ♀, same data as holotype; 3 ♂, 4 ♀, same data except 4.ix. (2 ♂, 2 ♀ BMNH); 4 ♂, 2 ♀, Moss Forest Camp, 2800 m, 9.x.–5.xi.1938 (*L. J. Toxopeus*) (1 ♂, 1 ♀ BMNH).

Comments. *P. inhabilis* is representative of the *inhabilis*-group. Several undescribed and similar species have been examined, therefore care should be taken to check the genitalia when assigning specimens to this species.

Polysastra irregularis sp. n.

(Figs 66–67, 93, 136, Map 5)

General form. Length 10·0–11·5 mm. Elytra subparallel-sided, post-humeral sublateral longitudinal depressions shallow and ill-defined, outer margins forming ridges, surface of elytron rugose, punctures grouped between irregular non-punctate raised areas, majority of setae confined within margins of punctures, rest long, forming sparse, erect longitudinal rows. Head, pronotum and scutellum deep reddish to pitchy brown, elytron either concolorous with pronotum or lighter purplish red. Femora, except for apices, and abdomen testaceous. Antennae, apices of femora, tibiae and tarsi reddish to pitchy brown. Metasternum pitchy brown to black. Setae grey or pale golden. Fully winged.

Diagnosis. Head with frons somewhat flattened medially, weakly declivous anteriorly, sides more or less equal in elevation to post-antennal swellings which are distinctly elevated above level of vertex, hind margins of swellings ill-defined due to coarse, irregular, mostly confluent puncturation of vertex, derm microsculptured, setae very fine. Pronotum transverse, *c.* 1·8× broader than long, lateral tooth well developed, width across tooth 1·2× minimum posterior width, lateral depressions distinct, median depressions fairly well defined, puncturation irregular, punctures becoming denser at sides, majority of

punctures not more than half their own width apart, sparser in and around median depressions, derm microsculptured, setae fine and adpressed, majority not extending much beyond margins of punctures. Scutellum triangular, 1·2× longer than broad, punctures slightly smaller and shallower than those on pronotum, mostly confined to median area, setae fine and adpressed, extending beyond margins of punctures. Elytron *c.* 3·8× as long as broad, width increasing gradually from humeral angle to a maximum just anterior to apical quarter, maximum width *c.* 1·3× greater than width at apex of scutellum, apices evenly rounded, surface irregularly rugose, raised areas between punctures distinctly microsculptured, punctures on average not more than their own width apart, size fairly uniform throughout, those on humeral area slightly larger than rest. Underside finely and densely punctured throughout, metepisternum strongly microsculptured. Punctures on anterior region of metasternum 1·5–2·0× their own width apart, becoming sparse and almost absent on median area of posterior half, microsculpture present towards sides of metasternum, setae long and fine, becoming shorter and more adpressed at sides. Punctures on abdominal segments 1·0–1·5× their own width apart. Femora finely and irregularly punctured, punctures 4·0–5·0× their own width apart on basal three-quarters and 1·5–2·0× their own width apart on apical quarter, setae long, fine and adpressed. Tibiae finely granulate, setae shorter and stouter than on femora, density increasing towards apices. Genitalia as in Figs 66–67, 93.

Holotype ♂, **Papua New Guinea**: NE. Morobe, Mt Kaindi, 2350 m, 18.vi.1973 (*J. L. Gressitt*) (BPBM).

Paratypes. **Papua New Guinea**: 2 ♂, 9 ♀, same data as holotype (1 ♂, 4 ♀ BMNH); 5 ♀, Morobe District (E), Mt Kaindi nr Wau, 2350 m, 3.ix.1973 (*J. L. Gressitt*); 2 ♂, 7 ♀, Mt Kaindi, 2400 m, 27.i.1963, 28.i.1963 (*J. Sedlacek*) (1 ♂, 3 ♀ BMNH); 5 ♀, Mt Kaindi, 2300 m, 2.iii.1966, 6.iv.1966, 4.iv.1966, 4.v.1967, 15.ix.1973, 2.i.1974 (*J. L. Gressitt*); (2 ♀ BMNH); 1 ♀, Mt Kaindi, 2350 m, 7.iv.1966, Malaise trap (*J. L. & M. Gressitt*); 2 ♀, Mt Kaindi, 2350 m, 22.vii.1974, 9–1.x.1974 (*A. D. Hart*); 3 ♀, Mt Kaindi, 2300 m, 10.i.1962, 8–9.vi.1962, 1–5.1962 (*J. Sedlacek*) (1 ♀ BMNH); 2 ♀, Mt Kaindi, 2250 m, 10.v.1968 (*J. Sedlacek*); 1 ♀, Mt Kaindi, 2300 m, 22.iii.1964 (*Josef Ku*); 1 ♂, 3 ♀, Mt Kaindi, on Meari Creek 9·5 mi[les] from Wau, 2050 m, 12.iii.1959 (*L. T. Brass*) (2 ♀ BMNH); 2 ♀, Wau, Edie Creek, 189 m, 8.viii.1963 (*P.S.E.L.*); 1 ♀, Wau, Edie Creek, 2000 m, 4–10.x.1961, m.v. light-trap (*J. & J. H. Sedlacek*); 1 ♀, Edie Creek, 14 km SW. Wau, 2000 m, 27.v.1962 (*J. L. Sedlacek*), 1 ♀, Edie Creek, 7000 ft, stn no. 6, 17.ix.1964 (*M. E. Bacchus*) (BMNH); 1 ♀, Wau, 1000–1250 m, 3.iii.1964 (*J. Sedlacek*); 1 ♀, Wau, 2400 m, 9–12.i.1962 (*J. & J. H. Sedlacek, G. Monteith & native collector*); 1 ♀, Wau, 1200 m, 26–27.ix.1964, m.v. light-trap (*J. Sedlacek*); 2 ♂, 1 ♀, Owen Stanley Range, Goilala, Bome, 1950 m, 24.ii–15.iii.1958 (*W. W. Brandt*); 1 ♂, same data except Loloipa, 21–31.xii.1957; 1 ♀, Central District, Mt Goliath, 5000–7000 ft (*S. Meek*) (MCZ); 1 ♀, Juliana bivak, 1800 m, 1.ix.1959 (RHN). (All BPBM unless otherwise stated.)

Comments. This species is representative of the *irregularis*-group. The species described here to which it bears the closest affinity is *duplicator*.

Polysastra kampeni (Weise) **comb. n.**

Sastra kampeni Weise, 1917: 207. Type, Papua New Guinea: Hoofdbivak [on Sepik River, 4°4′S, 141°15′E], xi.1910 (depository unknown).

Comments. This species belongs to the *costatipennis*-group. It has not been possible to locate the type or any specimens determined as such, and the transfer is based on characters given in the original description.

Polysastra laetabilis (Weise) **comb. n.**

(Figs 70, 123, Map 2)

Sastra laetabilis Weise, 1917: 206. LECTOTYPE ♂, Papua New Guinea: Hoofdbivak (Sepik River), 12.x.1910 (*Kampen*) (NR). (NR), here designated [examined].

Additional material examined

Papua New Guinea: 1 ♀, same data as lectotype except 12–16.xi.1910 (NR); 1 ♂, May River, 6.vi.1963 (*R. Stratman*) (BMNH); 1 ♂, Mindimbe, Sepik River, 25.iv.1963 (*R. Stratman*) (BPBM).

Comments. This species belongs to the *costatipennis*-group and has the same type of aedeagus as *purpurasco*.

Polysastra metallica (Jacoby) **comb. n.**

(Figs 55–57, 99, 132, Map 7)

Sastra metallica Jacoby, 1886: 72. Holotype ♀, New Guinea: 'Ramoi, ging [18]72' (*L. M. D'Albertis*) (MCSN) [examined].
Gronovius andaiensis Jacoby, 1905: 500. Holotype ♀, Irian Jaya: Andai (BMNH) [examined]. **Syn. n.**

Additional material examined
1 ♀, No. 88, 4.viii.1903 (no further data) (ITZ). **Papua New Guinea**, **Irian Jaya**: 127 examples, various localities (Map 7) (BMNH, BPBM, MCZ, OIP, SMT).

Comments. This species belongs to the *metallica*-group. Of the species described here it is closest to *suavis*; however, there are also a number of undescribed species which are similar in appearance to *metallica*, therefore the genitalia should be examined when determining specimens.

Polysastra micropunctata sp. n.

(Figs 52, 85, 130, Map 3)

General form. Length 10·5–11·5 mm. Elytra subpyriform, setae confined within margins of punctures, puncturation fine and dense throughout, post-humeral sublateral depressions absent, apices rounded, underside of elytron with a well developed supracostal flanage which runs parallel to epipleuron, from base of elytron to apical quarter where it curves inwards to meet sutural margin (Fig. 130), appearing as a narrow groove on dorsal surface. Vertex, pronotum and scutellum densely and confusely punctured throughout. Head, antennae, pronotum, scutellum, legs and underside except for abdomen, deep purplish brown to black, abdomen testaceous; elytron deep purplish brown to pitchy brown with a very weak, deep purplish green lustre, lateral margins bright orange-red from below humeral quarter (at a level equal to that of apex of metepisternum) to apex. Setae grey.

Diagnosis. Head with frons convex, weakly declivous anteriorly, elevation more or less equal to that of post-antennal swellings, post-antennal swellings well defined, distinctly elevated above vertex, vertex with an area of irregular, large, shallow confluent punctures directly behind swellings, rest of vertex finely and densely punctured throughout, punctures similar in size to smallest punctures on pronotum, derm strongly microsculptured, median area of vertex posterior to eyes with a shallow, oblique, ovate depression either side of 'suture'; setae very fine. Pronotum transverse, *c.* 1·8× as broad as long, lateral tooth well developed, width at tooth on average 1·2× greater than minimum posterior width, sublateral depressions well defined, median depressions shallow and ill-defined, punctures on disc shallow, distinctly larger than rest, remainder of pronotum finely and densely punctured throughout, often ill-defined due to strong microsculpturing of derm, setae long and fine, slightly shorter and stouter in median depressions. Scutellum, finely and densely punctured and strongly microsculptured, setae as on pronotum. Elytron 3·4× longer than broad, becoming gradually broader from just below humerus to a maximum width at around middle, after which it gradually decreases towards apex, maximum width in ♀ *c.* 1·3× greater than width at apex of scutellum, slightly less in ♂; dorsum more or less evenly convex, slight depression just prior to humeri below apex of scutellum. Puncturation irregular and dense throughout, punctures 1–2× their own width apart, more or less uniform in size, derm strongly microsculptured, setae shorter and denser than on pronotum, majority pale grey interspersed with slightly stouter white setae, ventral surface of elytron with a well developed supracostal flange which runs parallel to epipleuron from base to apical quarter where it curves inward to meet sutural margin. Underside finely and densely punctured throughout, punctures not more than 1·5× their own width apart, derm microsculptured, setae on abdomen slightly longer than those on rest of segments. Legs with femora minutely and densely punctured, punctures not more than their own width apart, setae long, fine and adpressed, tibiae granulate, setae short and stout, increasing in density towards apices. Wing fully developed. Genitalia as in Figs 52, 85.

Holotype ♂, **Papua New Guinea**: Morobe District, Arabuka, 1500–2000 m, 7.i.1968 (*J. & M. Sedlacek*) (BPBM).

Paratypes. 2 ♀, same data as holotype (BPBM, BMNH).

Comments. This species represents the *micropunctata*-group and is one of those defined in subgroup 1. The species described here to which it bears the closest affinity is *montana* from

which it can be readily distinguished by the presence of a supracostal flange on the underside of the elytron.

Polysastra montana sp. n.

(Figs 53, 86, 129, Map 3)

General form. Length 10·0–13·1 mm. Elytra subparallel-sided, post-humeral sublateral depressions absent, setae extending well beyond margins of punctures, puncturation fine, dense and more or less uniform throughout; head, pronotum and scutellum densely and confusely punctured throughout. Head, antenna, pronotum and legs dark orange-brown to reddish brown, scutellum usually darker brown than pronotum, elytron either concolorous with pronotum or lighter yellowish to orange-brown, derm with a slight aeneous lustre; abdomen testaceous, rest of underside dark reddish to pitchy brown; setae pale golden.

Diagnosis. Head with frons flattened dorsally, post-antennal swellings with hind margins ill-defined, surface coarsely punctured with large shallow confluent punctures; surface of vertex irregular, area directly behind swellings coarsely and irregularly punctured, rest of area finely and densely punctured throughout, punctures not more than their own width apart, median area of vertex posterior to eyes with a shallow oblique, ovate admedian depression, derm strongly microsculptured throughout, setae long, fine and adpressed. Pronotum transverse, 1·7–1·8× as broad as long, sometimes slightly less in ♂, lateral tooth acute, width at tooth 1·2× greater than minimum posterior width, sublateral depressions present but shallow and ill-defined, puncturation fine and dense throughout, punctures not more than half their own width apart, sometimes indistinct due to strong microsculpture on derm, setae similar to those on vertex. Scutellum *c.* 1·4× longer than broad, weakly convex medially, finely and densely punctured throughout, derm strongly microsculptured, setae as on elytron. Elytron 4× as long as broad, width increasing very gradually from below humeral quarter to a maximum at about apical quarter, maximum width 1·2–3·0× greater than that at apex of scutellum, apex evenly rounded, underside of elytron with a small, shallow ovate pit just prior to apicosutural angle. Puncturation minute and more or less uniform throughout, punctures not more than their own width apart, derm microsculptured, setae adpressed, slightly shorter than those on pronotum. Underside finely and minutely punctured throughout, punctures not more than 1·5× their own width apart, those on metepisternum and adjacent area of metasternum becoming granulate, derm more strongly microsculptured in these areas, setae on disc of metasternum and centre of abdominal segments longer than those at sides. Legs with femora minutely punctured throughout, punctures 2–3× their own width apart, derm distinctly microsculptured, setae on lateral surfaces distinctly longer and finer than rest; tibiae granulate, setae short and stout. Genitalia as in Figs 53, 85.

Holotype ♂ (dissected), **Papua New Guinea**: Mt Dayman, Maneau Range, 2230 m, N. slope no. 4, 19.v.–19.vi.1953 (*G. M. Tate*) (AMNH).

Paratypes. **Papua New Guinea**: 2 ♂, 7 ♀, same data as holotype (1 ♂, 1 ♀ BMNH, rest AMNH); 1 ♀, Mt Suckling, Exp. Camp Mau 2, 1700 m, 2.vii.1972, black light (*T. L. Fenner*) (BMNH).

Comments. This species belongs to the *micropunctata*-group and represents those species of subgroup 1 that lack the supracostal flange on the underside of the elytron. The species described here to which it bears the closest affinity is *micropunctata* from which it can be readily distinguished by the absence of a supracostal flange on the underside of the elytra.

Polysastra obscuricornis (Blackburn) **comb. n.**

(Figs 71, 87, 121, Map 8)

Sastra obscuricornis Blackburn, 1896: 84. Holotype ♀, Australia: N. Qu[eensland], no. 6040 (BMNH) [examined].

Additional material examined

Australia: 65 examples, N. Queensland, various localities (Map 8) (ANIC, BMNH, MCZ, NMV, NR, SAM, UQ).

Comments. This species belongs to the *costatipennis*-group and is most closely related to *costatipennis*.

Plant associate. *Laportea* sp.

Polysastra purpurasco sp. n.

(Figs 73, 74, 90, 91, 124, 125, Map 2)

General form. Length 8·0–11·3 mm. Elytra subparallel-sided, post-humeral sublateral longitudinal depressions present, outer margins forming cariniform ridges which are joined at base of humeri; an irregularly developed ad-median carina present, running more or less parallel to inner margin of depression; median area of basal quarter convex; puncturation more or less uniform throughout, vestigial strial setae short and erect, rest of setae minute and confined within margins of punctures. Head and pronotum distinctly punctured. Head testaceous to pitchy black, pronotum testaceous to dull reddish brown, underside and femora testaceous to orange-brown, tibiae distinctly darker in colour than femora; elytron light reddish brown to pinkish purple or deep submetallic green, setae pale golden. Fully winged.

Diagnosis. Head with frons triangular, strongly convex medially, maximum elevation slightly greater than that of post-antennal swellings, post-antennal swellings not strongly convex, hind margins often ill-defined and confluent with vertex. Vertex irregularly punctured with large, shallow punctures which are mostly concentrated behind post-antennal swellings, confluent in places; derm weakly microsculptured with a vitreous lustre, setae short and fine, mostly adpressed. Pronotum transverse, on average 2·1× broader than long, lateral tooth not well developed, apex rounded, width at tooth 1·2× greater than minimum posterior width. Dorsal depressions distinct, puncturation dense and irregular, average puncture size more or less equal to largest on vertex, often indistinct due to vitreous lustre of derm; setae minute, decumbent. Scutellum with maximum width more or less equal to length, apex rounded, derm microsculptured with small shallow irregular punctures, setae minute, decumbent. Elytron on average 3·7× longer than broad, width increasing gradually from humerus to a maximum around middle, maximum width 1·2× greater than width at apex of scutellum; cariniform margins of post-humeral sublateral depression present from base of humeral angle, where they are joined, to apical quarter where they become obsolete, carinae more or less parallel and separated by the width occupied by *c.* 6–7 punctures, an irregularly developed ad-median carina present, running more or less parallel to inner margin of depression and becoming obsolete in apical quarter, width between ad-median carinae and inner marginal ridge slightly less than *c.* width of 5 punctures, area on basal quarter between ad-median carina and sutural margin convex, puncturation more or less uniform throughout, slightly coarser on basal quarter, punctures slightly smaller than those on pronotum, 0·5–0·15× their own width apart, derm smooth and shining. Underside finely and densely punctured throughout, punctures on metasternum 3–4× their own width apart, becoming slightly denser along lateral margins; derm smooth and shining, setae short, fine, decumbent, becoming adpressed along margins; metepisternum strongly microsculptured, punctures dense, 1·0–1·5× their own width apart, setae short and adpressed. Abdomen minutely punctured, punctures 3–4× their own width apart, derm weakly microsculptured, setae very fine, longer than on metasternum, particularly at sides, femora finely punctured with small shallow punctures 3–4× their own width apart on basal three-quarters, dense at apices, setae long fine and adpressed; tibiae finely granulate, setae becoming shorter and more erect towards apices.

Comments. This species belongs to the *costatipennis*-group and is mostly closely related to *obscuricornis*, having the same type of facies and aedeagus; apart from genitalia and coloration it differs principally by having the elytral margins less explanate and the carinae better developed, and the elytra are also slightly less densely punctured. For genitalic differences see Figs 71, 73. *P. purpurasco* also bears close affinity to *fuscitarsis*.

Polysastra purpurasco purpurasco subsp. n.

(Figs 73, 90, 124, Map 2)

Length 8·0–11·0 mm. Head, basal segments of antenna and scutellum pale testaceous to dull yellowish brown; elytra light reddish brown to deep pinkish purple, mature specimens with a deep bluish purple lustre over humeral area and sublateral depression. Underside testaceous, abdomen often dull orange-brown, femora testaceous to brownish yellow, apices of femora and rest of legs dark reddish brown. Head and pronotum moderately to densely punctured. General form slightly less robust than island subspecies. Genitalia as in Figs 73, 90.

Holotype ♂, **Papua New Guinea**: Wau, Morobe District, Hospital Creek, 1200 m, i.1965 (*J. Sedlacek*) (BMNH).

Paratypes. **Papua New Guinea**: 4 ♂, 8 ♀, same data as holotype (2 ♀, 3 ♀ BMNH); 2 ♀, Wau, 1050 m,

4.xi.1961; 1 ♂, Wau, 1150 m, 12.ix.1961 (all *J. Sedlacek*); 1 ♀, Wau, 1200–1300 m, 23.xii.1961 (*G. Monteith*); 3 ♂, 2 ♀, Wau, 1200 m, 13.viii.–14.x.1961 (*J. Sedlacek*); 4 ♂, 4 ♀, Wau, 1200 m, light-trap, 14.vi.–22.x.1961; 2 ♂, 7 ♀, Wau, 1200 m, m.v. light-trap, 11.x.–25.xi.1961 (all *J. J. & M. Sedlacek*) (2 ♂, 3 ♀ BMNH); 1 ♀, Wau, 1700–1800 m, 17.xi.1961; 1 ♂, 5 ♀, Wau, 1200 m, 1.v.–10.x.1962; 1 ♂, 4 ♀, Wau, 1200 m, light-trap, 16.ii.–15.vii.1962; 1 ♂, 2 ♀, Wau, 1200 m, m.v. light-trap, 2.x., 28.xii.1962; 7 ♀, Wau, 1250 m, 5.i.1963, m.v. light-trap (2 ♀ BMNH); 1 ♀, Wau, 1200 m, 5.x.1962, Malaise trap; 4 ♂, 2 ♀, 1250 m, 14.i., 21.i.1963 (1 ♂, 1 ♀ BMNH); 2 ♂, 9 ♀, Wau, 1200 m, m.v. light-trap, 4.i.–23.x.1963 (1 ♂, 2 ♀ BMNH); 6 ♀, Wau, 1200–1250 m, 4.ii.–19.viii.1964 (all *J. Sedlacek*); 3 ♂, 3 ♀, 1200 m, 26.iii.–30.vii.1964 (*J. & J. Sedlacek*); 3 ♂, 12 ♀, same data except m.v. light-trap (2 ♀ BMNH); 1 ♂, Wau, 1200–1300 m, 22.x.1965 1 ♀, Wau, 1700–1800 m, 27.ix.1965; 1 ♂, Wau, 1100–1300 m, 1.ii.1966 (all *J. Sedlacek*); 1 ♀, Wau, 1200 m, 25.viii.1966 (*G. A. Samuelson*); 1 ♀, Wau, 1200 m, iv.1966, light-trap (*J. L. Gressitt*); 2 ♂, Wau, 1200 m, 14.iii.1966 (*J. L. Gressitt & Wilkes*); 1 ♀, Wau, 1200 m, 26.iii.1966, light-trap (*J. L. Gressitt*) (BMNH); 2 ♂, Wau, 1200 m, 3.ii.1966 (*J. Sedlacek*); 1 ♀, Wau, 1200 m, 24.iii.1968, *Acalypha* sp. (*J. Sedlacek*); 1 ♂, Wau, 1200 m, i.1968 1 ♀, Wau, 8.ix.1968 (all *J. & M. Sedlacek*); 1 ♀, Wau, 1200 m, 28.i.1974, K 606, *Pipturus*; 1 ♂, 1200 m, 27.v.1974, at light (*A. D. Hart*) (*WEI*); 1 ♂, Wau, 1150 m, 6.iii.1974, beaten from *Coffea arabica* (*J. J. H. Szent-Ivany*); 1 ♂, Wau, 1200 m, 24.vii.1974, Myrtaceae, *Eugeni stipularis* (*G. Otaweto*) (WEI); 1 ♂, Wau, Wau Creek, 1200–1500 m, 28.iii.1963; 1 ♂, 6 km W. of Wau, Nami Creek, 1700 m, 12.vi.1962 (all *J. Sedlacek*); 1 ♂, Wau, Coviak Ridge, 763 m, 7.xii.1963 (*H.C.*); 1 ♀, 32 km SW. of Lae, 100 m, 23.iii.1963 (*J. Sedlacek*); 2 ♂, Garaina, 550–750 m, 16.i.1968; 1 ♂, Garaina-Saureli, 900–1400 m, 5.i.1968 (all *J. & M. Sedlacek*); 1 ♀, Karimui, 4.vi.1961, light-trap (*J. L. Gressitt*); 1 ♀, Kassam, 1350 m, 48 km E. of Kainantu, 7.xi.1959 (*T. C. Maa*); 1 ♂, Owen Stanley Range, Goilala-Loloipa, 16–30.xi.1958 (*W. W. Brandt*); 1 ♀, Tsenga, 1200 m, Upper Jimmi V, 15.vii.1955, light-trap (all *J. L. Gressitt*); 2 ♀, Finisterre Range, Saidor, Matoko village, 6–24.ix.1958 (*W. W. Brandt*); 1 ♀, Wau, 14.ii.1970 (OIP); 2 ♀, Gadsup, ix.1973 (all *H. Ohlmus*); 1 ♀, Popondetta area, 8–10.iv.1966 (*R. Rodzyork*), 25521; 1 ♂, Melambi River, Lae, Mirilunga village, 4500 m, 29.xii.1956 (*J. H. Ardley*), 19073; Kaparvia-Sangi, or Kododa, 600 m, 26.111. 1956 Curcuma; 1♂ 1 ♀, Wapenamanda School, 5700 ft, West Highlands, 21.iii.1960 (*J. H. Barrett*), 25596; 1 ♀, Luth, Mission Garden, Wau, 3500 ft, 2.vi.1957 (*J. J. H. Szent-Ivany*), 19050; 1 ♀, Bisianumu-Sogeri, Agri. Exp. Sta., 20.iii.1955 (*J. J. H. Szent-Ivany & A. Himson*), 19051 (all PNGDA); 1 ♂, 1 ♀, Madang Dist., Finisterre Mts, Budemu, *c.* 4000 ft, 15–24.x.1964 (BMNH); 4 ♀, Madang Dist., Finisterre Mts, Damanti, 3550 ft, 2–11.x.1964 (all *M. E. Bacchus*), 1 ♂, Kokoda, 1200 ft, ix.1933; 1 ♀, Mondo, 5000 ft, iii.1934 (all *L. E. Cheesman*) (all BMNH); 1 ♂, New Britain, Gazelle Pen., Gaulim, 130 m, 28.xi.1962 (*J. Sedlacek*). (All BPBM unless otherwise stated.)

PLANT ASSOCIATES. *Coffea arabica, Curcuma* sp., *Pipturus* sp., *Eugeni stipularis, Acalypha* sp.

Polysastra purpurasco viridis subsp. n.

(Figs 74, 91, 125, Map 2)

Length 8·0–11·3 mm. Differs from the nominate mainland form as follows. Head deep reddish brown to pitchy black. Pronotum and scutellum opaque, testaceous, vitreous lustre lacking. Elytra dark submetallic green with a slight aeneous lustre, longitudinal area between lateral margin and carina formed by outer margin of sublateral depression bright reddish to orange-brown. Underside testaceous to brownish orange. Femora except for apices testaceous, apices and rest of legs pitchy brown. Head and pronotum tend to be more strongly and densely punctured than in nominate mainland form. No other obvious structural differences have been observed. Genitalia as in Figs 74, 91.

Holotype ♂ (dissected), **D'Entrecasteaux Islands**: Normanby I., Wakaiuna, Sewa Bay, 1–18.i.1957 (*W. W. Brandt*) (BPBM).

Paratypes. **D'Entrecasteaux Islands**: 2 ♀, same data as holotype (BPBM, BMNH); 3 ♀, Fergusson I., ix–xii.1894 (*A. S. Meek*) (MCZ); 1 ♀, Fergusson I., mountains between Agamoia and Ailuluai, 900 m, no. 4, 5–7.vi.1957 (*L. T. Brass*) (AMNH).

Polysastra rugulosa (Weise) comb. n.

(Fig. 140)

Sastra rugulosa Weise, 1912: 438. Holotype ♀, NEW GUINEA: Erima (MNHU) [examined].

COMMENTS. This species belongs to the *irregularis*-group and is representative of subgroup 4.

Polysastra sedlaceki sp. n.

(Figs 64, 95, 137, Map 7)

General form. Length 11·0–15·0 mm. Elytra subparallel-sided, post-humeral sublateral depression present from base of humeri to just above apical quarter, outer margin of depressions forming a weak irregular ridge, surface of elytra weakly rugose with irregular smooth non-punctate raised areas, puncturation dense and irregular. Vertex and pronotum with large, shallow irregular punctures. Setae on elytron minute, majority confined within margins of punctures, few sparse long setae on intervals. Dorsum dull pinkish or reddish brown to deep purple-brown, outer margins of elytron often paler in colour, humeral area often with a slight greenish or pinkish lustre. Antenna and legs deep reddish to pitchy brown. Abdomen testaceous, rest of underside pitchy brown to black; basal three-quarters of femora often lighter in colour than rest of legs in male. Apices of elytron emarginate just before apico-sutural margin, more pronounced in female. Setae grey or pale golden. Fully winged.

Diagnosis. Head with frons evenly convex, sometimes somewhat flattened anteriorly, elevation less than that of post-antennal swellings. Post-antennal swellings distinctly elevated above level of vertex, margins well defined, lateral margins not contiguous with inner margins of eyes, surface microsculptured and sparsely punctured. Vertex irregularly punctured throughout with large, shallow, often confluent punctures, derm weakly microsculptured, median 'suture' distinct, setae long and fine. Pronotum transverse, on average 2·0× (♀), 1·8× (♂) broader than long, lateral tooth well developed and broadly rounded, width at tooth on average 1·2× greater than minimum posterior width, depressions shallow and poorly defined, puncturation irregular, size of punctures similar to those on vertex, punctures on average not more than half their own width apart, those at sides often confluent and usually larger than those on disc, derm microsculptured with a weak aeneous lustre, setae fine, mostly confined within margins of punctures. Scutellum 1·1× longer than broad, apex subtruncate, central area densely punctured with small shallow punctures, setae extending beyond margins of punctures. Elytron on average 3·8× longer than broad, width increasing gradually from base of humeral angles to a maximum at around apical quarter, maximum width 1·3× greater than that at apex of scutellum; elytral puncturation irregular due to rugosities, punctures, in groups, not more than their own width apart; size of elytral punctures less than that of the smallest punctures on pronotum, punctures on area around scutellum somewhat larger and coarser than rest, derm shining, raised areas weakly microsculptured. Underside finely and densely punctured throughout, metepisternum finely granulate, derm microsculptured, setae dense, punctures on posterior half of metasternum around median groove, 2·0–2·5× their own width apart, setae almost absent, derm smooth and shining, rest of surface densely punctured, those at sides less than their own width apart, derm distinctly microsculptured, setae dense, short and fine; punctures on abdominal segments not more than their own width apart, derm microsculptured, setae becoming slightly shorter and denser at sides, setae slightly stouter than those on metasternum; basal three-quarters of femora irregularly punctured with small shallow punctures up to 3× their own width apart, apical quarter densely punctured, punctures not more than their own width apart, microsculpture becoming stronger towards apices, lateral setae long, fine and adpressed, dorsal setae slightly shorter and stouter; tibiae finely granulate, setae becoming shorter and stouter towards apices. Genitalia as in Figs 64, 95.

Holotype ♂ (dissected), **Papua New Guinea**: Morobe Dist., Wau, 1200 m, 20–26.v.1962 (*J. Sedlacek*) (BPBM).

Paratypes. **Papua New Guinea**: 1 ♂, Wau, 1100–1300 m, 2.i.1966 (*J. Sedlacek*); 1 ♂, Wau, 1200 m, 1.ix.1961, light-trap (*J. Sedlacek*) (BMNH); 1 ♂, no. 10, Purosa Camp, Okapa area, 1950 m, ix–27–1959 (AMNH); 1 ♀, Owen Stanley Range, Goilala, Tapini, 975 m, 16–25.xi.1957 (*W. W. Brandt*); 1 ♀, same data except Tororo, 1560 m, 15–20.xi.1958; 1 ♀, Wau, 1050 m, 4.xi.1961 (*J. H. Sedlacek*) (BMNH); 1 ♀, Wau, 1200 m, 15.ix.1961, light-trap (*J. & M. Sedlacek*); 1 ♀, Wau, 1200 m, 4–7.i.1963, m.v. light-trap (*J. Sedlacek*) (BMNH); 1 ♀, same data except 29.viii.1963; 1 ♀, Wau, 1200 m, 16–17.viii.1964 (*J. Sedlacek*); 1 ♀, Wau, 1200–1300 m, 4.ix.1965 (*J. Sedlacek*); 1 ♀, same data except 15.viii.1965; 1 ♀, same data except 15.viii.1965; 1 ♀, same data except 1–9.ix.65 (BMNH); 1 ♀, Wau, 1200 m, 9.iii.1965 (*J. Sedlacek*); 1 ♀, Wau, 1200 m, 24.vii.1965 (*J. & M. Sedlacek*). (All BPBM unless otherwise stated.)

Comments. *P. sedlaceki* is representative of the *irregularis*-group and is related to *irregularis* and *duplicator*.

Polysastra suavis sp. n.

(Figs 54, 98, 131, Map 7)

General form. Length 9·8–12·0 mm. Elytra pyriform, post-humeral sublateral depressions weak, outer margin of depression forming an irregular ridge, inner margin indicated by a short sinuate ridge just below basal quarter, puncturation dense and irregular, setae confined within margins of punctures, 'strial' setae on interspaces short and erect. Head and pronotum indistinctly punctured. Head deep reddish brown to black, pronotum and scutellum either concolorous with head or light reddish brown. Elytron dark metallic green with a weak aeneous lustre, or deep metallic blue with a purplish lustre. Underside and femora either brownish orange or with metasternites and legs pitchy brown to black. Abdomen testaceous; setae pale golden. Fully winged.

Diagnosis. Head with frons convex, maximum elevation equal to that of post-antennal swellings, post-antennal swellings convex, margins distinct, hind and lateral margins oblique, anterior outer angle contiguous with inner margin of eye, derm smooth and shining, vertex with large, shallow irregular punctures surrounding a central, slightly raised impuctate area, derm microsculptured, setae long and fine, confined to punctate areas. Pronotum on average 1·8× broader than long, lateral tooth broad and weakly developed, width at tooth 1·0× greater than minimum posterior width, lateral depressions shallow but distinct, median depressions well defined, linked by a narrow longitudinal groove, posterior depression almost circular, puncturation shallow and indistinct due to vitreous lustre, punctures 1·0–1·5× their own width apart, derm weakly microsculptured, setae minute and decumbent. Scutellum more or less as broad as long, apex rounded, minutely punctured, setae adpressed, extending beyond margins of punctures. Elytron slightly explanate at side, on average 3·1× longer than broad, maximum width 1·5× greater than width at apex of scutellum, apices evenly rounded; basal quarter between humeri and sutural margin, delimited laterally and posteriorly by shallow depressions, median area of elytron weakly convex; post-humeral sublateral longitudinal depression shallow, outer margins forming an irregularly developed ridge from humeri to apical quarter, inner margin only partially indicated by a very short sinuate ridge just below basal convexity, lateral margins weakly explanate from below humeral angles to just above apical quarter, punctures 1–2× their own width apart, shallow and indistinct in places, derm weakly and irregularly punctured. Underside finely punctured throughout, metepisternum minutely punctured, punctures 2·5–3·0× their own width apart, derm microsculptured, setae long and adpressed, adjacent area of metasternum weakly alutaceus with minute punctures 2–3× their own width apart, setae long and decumbent, slightly finer than those on metepisternum; abdomen minutely punctured, punctures 5–6× their own width apart, derm weakly microreticulate, setae very fine, length of those in centre of segments more or less equal to longest on metasternum, those at sides shorter, decumbent or suberect, femora except for apices minutely punctured, punctures 5–6× their own width apart, dense at apex, derm strongly microsculptured at apex, setae long, fine and adpressed, short at apices. Tibiae granulate, setae shorter, stouter and suberect. Genitalia as in Figs 54, 98.

Holotype ♂ (dissected), **Papua New Guinea**: Morobe district, Wau, 1300 m, 22.xii.1961 (*J. & J. H. Sedlacek*) (BPBM).

Paratypes. **Papua New Guinea**: 1 ♂, Wau, 1450 m, 6.ii.1963 (*J. Sedlacek*) (BMNH); 1 ♂, 1 ♀, Finisterre Range, Saidor, Matoko Village, 6–24.ix.1958 (*W. W. Brandt*) (1 ♀ BMNH); 2 ♀ Finisterre Range, Saidor, Kambavi Village, 1–28.viii.1958 (*W. W. Brandt*) (1 ♀ BMNH); 1 ♀, Wau, 1450 m, 20.xii.1961 (*J. & M. Sedlacek*); 1 ♀, Mt Kaindi, 2350 m, 23.iii.1966, light-trap (*J. L. Gressitt*); 1 ♀, Wau, Kunai Creek, 1270 m, 22.viii.1963 (*J. Sedlacek*) (BPBM); 1 ♀, Finisterre Mts, Budemu, *c.* 4000 ft, 15–24.x.1964 (*M. E. Bacchus*) (BMNH).

Comments. *P. suavis* is representative of the *metallica*-group. The species included here to which it bears the closest affinity is *metallica* (see specific key for distinguishing characters, p. 225).

Polysastra varia sp. n.

(Figs 58–60, 100, 101, 146–148, Map 6)

General form. Length 8·5–12·0 mm. Elytra subparallel-sided, margins of post-humeral sublateral longitudinal depressions forming cariniform ridges, puncturation confused, dense throughout, setae minute, confined within margins of punctures. Head and pronotum with irregular, shallow, distinct puncturation. Coloration variable, specimens from the Huon Peninsula and the south-east have the elytron varying from light pinkish brown to deep purple with a deep blue or green submetallic lustre on humeral

area, which may extend over whole elytra in darker specimens. Teneral specimens light orange-brown with a slight green lustre on humeral area; head, pronotum and scutellum testaceous to orange-red, underside usually pale testaceous; antenna, tibiae and tarsi either concolorous with pronotum or dark reddish brown. Specimens from the NE. highland areas (Aiyura) have the elytron dark metallic green with dark brown lateral margins, the abdomen testaceous and the rest of the body black. All specimens seen from north-east of the Huon region, including Japen I., have the elytron bright metallic green with a brassy lustre, the head, pronotum, scutellum and femora deep orange to reddish orange; underside testaceous to light yellowish orange, antennal segments and tibiae usually darker in colour than femora. No distinct morphological differences were noted between the colour forms. Size tends to be very variable within populations.

Diagnosis. Head with frons entirely depressed to weakly concave. Vertex irregularly punctured, punctures large and shallow, confluent in places, average size slightly larger than largest pronotal punctures, derm surrounding punctures weakly microsculptured, rest smooth and shining, majority of setae confined within margins of punctures; post-antennal swellings elevated above level of vertex, hind margins ill-defined, derm almost impunctate. Pronotum transverse, *c.* 1·7–1·8× (♂) and *c.* 1·9–2·0× (♀) broader than long. Lateral tooth weakly developed, width at tooth *c.* 0·75× greater than minimum posterior width; punctures shallow, concentrated in and around sublateral depressions where they may become confluent, size variable, largest more or less equal to those on adjacent area of elytron, punctures 1·0–1·2× their own width apart, derm smooth and shining, weakly microsculptured around punctured areas. Scutellum weakly convex, punctures minute, 3–4× their own width apart, setae distinct, extending beyond margins of punctures, derm microreticulate. Elytron on average 3·3× longer than broad, maximum width at level more or less equal to that of second abdominal segment, width at this point *c.* 1·3× greater than that at level of apex of scutellum. Outer cariniform margin of post-humeral sublateral longitudinal depression distinct to apical quarter, inner cariniform margin indistinct until it converges with outer margin at a level more or less equal to that of apex of metepisternum, continuing till apical quarter where it becomes obsolete, width between carinae decreasing slightly towards apical quarter, a third, weakly developed admedian carina sometimes present, particularly in female, running more or less parallel to inner adlateral carina and becoming obsolete in apical quarter, linked to inner adlateral carina by a short, oblique, irregular convexity just below convergence of inner and outer carinae. Puncturation of elytron confused, density more or less uniform throughout, punctures 1·1–1·2× their own width apart, basal third sometimes slightly more coarsely punctured than rest of derm, particularly around scutellum and on humerus, derm weakly microsculptured, sometimes few sparse erect setae on intervals. Ventral surfaces minutely punctured throughout, metasternum convex, punctures 2·0–2·5× their own width apart, setae long, pale golden, derm smooth and shining; metepisternum distinctly microsculptured, punctures shallow, distinctly larger than those on metasternum, *c.* 0·5–1·0× their own width apart. Setae similar to those on sides of metasternum. Punctures on abdomen 2–3× their own width apart, derm weakly microsculptured, setae slightly longer than those on disc of metasternum. Legs with basal three-quarters of femora minutely punctured, punctures 2·0–2·5× their own width apart, apical quarter slightly more densely and coarsely punctured, derm microsculptured, setae long and appressed. Tibiae granulate, setae becoming shorter and denser towards apices. Fully winged. Genitalia as in Figs 58–60, 100, 101.

Holotype ♂, **Papua New Guinea**: Morobe District, Wau, 1200 m, 17.viii.1961, light-trap (*J. & M. Sedlacek*) (BPBM).

Paratypes. **Papua New Guinea**: 1 ♀, same data as holotype (BPBM); 12 ♂, 9 ♀, Morobe District, Wau, 1200–1300 m, 9.vii.–20.xi.1961, light- or Malaise trap (6 ♂, 3 ♀ BMNH); 1 ♂, 8 ♀, Wau, 1200 m, 11.iii.–10.x.1962, light- or Malaise trap (5 ♀ BMNH); 6 ♀, Wau, 1200 m, 21.i.–29.viii.1963, light- or Malaise trap (all *J. & M. Sedlacek*); 1 ♂, Wau, 1200 m, 23.x.1963, m.v. light-trap (*J. L. Gressitt*); 2 ♂, 7 ♀, Wau, 1200 m, 3.iv.–16.ix.1964, light-trap (*J. & M. Sedlacek*) (1 ♂, 2 ♀ BMNH); 1 ♀, Wau, no. 1187, 4000 ft, 21.x.1965 (*A. H. Kistner*); 1 ♀, Wau, Big Wau Creek, 1200 m, xii.1965, Malaise trap (*J. Sedlacek*); 1 ♂, Wau, 1200 m, 22.ii.1966 (*J. & M. Sedlacek*); 1 ♀, Wau, 7.iii.1970 (*H. Olmus*); 1 ♀, Lae, 17.vii.1970 (*H. Olmus*) (OIP); 1 ♀, Karimui, 3.vi.1961, light-trap (*J. L. & M. Gressitt*); 1 ♂, 1 ♀, Owen Stanley Range, Goilala, Loloipa, 11.–20.xii.1957; 1 ♀, Owen Stanley Range, Goilala, Tapini, 975 m, 16–25.xi.1957 (all *W. W. Brandt*); 2 ♂, Huon Peninsula, Pindu, 20.iv.1963 (*J. Sedlacek*); 1 ♀, Finisterre Range, Saidor, Sibong Village, 6–16.vi.1958 (*W. W. Brandt*); 3 ♂, Finisterre Mts, Madant District, Damanti, 3550 ft, 2–11.x.1964 (*M. E. Bacchus*) (BMNH); 6 ♀, Torricelli Mts, Mokai Village, 750 m, 8–15.xii.1958 (2 BMNH); 1 ♀, Torricelli Mts, Mobitei, 750 m, 5–15.iii.1959 (all *W. W. Brandt*); 1 ♂, 1 ♀, Hollandia, 300–600 m, i.1937 (*W. Stuber*) (BMNH); 1 ♀, Guega, W. of Swart Valley, 1200 m, 15.xi.1958; 1 ♂, Upper Jimmi Valley, 1000 m, 13.vii.1955; 1 ♀, Upper Jimmi Valley, 1300 m, Korop, 12.vii.1955 (all *J. L. Gressitt*); 1 ♀, 19002, Menyama, 4.i.1960 (*J. H. Ardley*); 1 ♀, 19059 N. Papua, Sangara Estate, 6.viii.1958, at rest on cacoa tree (*J. J. H. Szent-Ivany*) (DPI); 1 ♀, 2219, Afore, Boikik Plantation,

18.xii.1974 (*E. S. C. Smith*) ex cardomom (BMHN); 1 ♂, Aiyura, 25524, 5400 ft, 21.ii.1959, regrowth area; 2 ♂, 19043, 19008, Aiyura, 5400 ft, at light (no. 19008 BMNH); 1 ♂, 1 ♀, Aiyura, 6000 ft, 22.vii.1960, u.v. light; 1 ♀, 19054, Aiyura, i.ix.1960 (all *J. H. Barrett*) (DPI); 1 ♂, Garaina; 1 ♀, Goroka, ii.1975, at light (all *R. Hornabrook*) (RHW); 1 ♂, 2 ♀, Kainantu, 1650 m, 20–26.x.1959, m.v. light (*T. Maa*) (1 ♀ BMNH). (All specimens BPBM unless otherwise stated.)

COMMENTS. *P. varia* is representative of the *varia*-group. The species described here to which it bears the closest affinity is *venusta*; superficially it is very similar to *purpurasco*. It appears to be one of the most variable species examined and exhibits geographical colour variation.

PLANT ASSOCIATES. *Theobroma cacao, Elettaria cardamomum, Coffea arabica.*

***Polysastra venusta* sp. n.**

(Figs 61, 127, Map 5)

GENERAL FORM. Length 8·0–10·0 mm. Elytra subparallel-sided, post-humeral sublateral longitudinal depression present, outer margins forming distinct ridges which are joined below humeri at a point level with middle of metasternum, outer ridge distinct from base of elytron to apical quarter, inner ridge becoming obsolete just above termination of outer ridge in apical quarter, a third longitudinal ridge is weakly indicated parallel to inner ridge, lateral separation equal to space occupied by five punctures, surface densely and regularly punctured throughout, pronotum almost impunctate, punctures shallow and ill-defined due to vitreous surface. Head testaceous to bright purplish red, pronotum either concolorous with head or slightly darker; elytron deep yellowish orange to purplish red, humeral area with a strong, dull, dark green submetallic lustre which extends posteriorly over sublateral depression in purplish specimens. Underside testaceous to orange, legs either entirely testaceous to yellowish brown or with tibiae and tarsi pitchy brown. Majority of elytral setae confined within margins of punctures, interspersed with a few long, erect setae on interspaces. Fully winged.

DIAGNOSIS. Head with frons completely depressed anteriorly. Post-antennal swellings distinct from vertex, posterior margins rounded, anterior outer angle contiguous with inner margin of eye; vertex irregularly punctured with moderately large shallow punctures, majority situated around middle of vertex, derm weakly microsculptured, setae very fine and adpressed, median 'suture' distinct. Pronotum transverse, on average 1·9× broader than long, lateral tooth not well developed, apex subacute, width at tooth 1·1× greater than minimum posterior width, depressions shallow and ill-defined, puncturation sparse, indistinct due to vitreous surface of derm, punctures shallow, similar in size to those on vertex, majority situated along anterior margin, setae very small and fine. Scutellum triangular, length more or less equal to maximum width, derm weakly microsculptured, punctures minute, setae short and fine. Elytron on average 3·3× longer than broad, width increasing gradually from base of humeral angles, reaching a maximum in apical quarter, maximum width 1·3× greater than that at apex of scutellum, puncturation more or less uniform throughout, punctures not more than their own width apart, slightly coarser in basal quarter, derm microsculptured. Underside finely and densely punctured throughout, punctures on metasternum 1·0–1·5× their own width apart, derm smooth and shining, becoming slightly microsculptured at sides, metepisternum distinctly microsculptured, puncturation tending to become granulate, setae fine and decumbent, punctures on abdominal segments minute, 2·0–2·5× their own width apart, derm shining, very finely microsculptured, setae very fine, slightly longer than those on metasternum, particularly towards middle of segments. Femora densely and finely punctured throughout, punctures not more than their own width apart, setae long, fine and adpressed, tibiae finely granulate, setae dense, stouter and more erect than on femora, density increasing towards apices. Genitalia as in Fig. 61.

Holotype ♂ (dissected), **Papua New Guinea:** Torricelli Mts, Wantipi, vill[age], 30.xi–8.xii.1958 (*W. W. Brandt*) (BPBM).

Paratypes. **Papua New Guinea:** 2 ♂, same data as holotype; 1 ♂, Kumur, Upper Jimmi V[alley], 1000 m, 13.vii.1955 (*J. L. Gressitt*); 1 ♂, 1 ♀, Humboldt Bay, Bewani Mts, 400 m, vii.1937 (*W. Stüber*) (BMNH).

COMMENTS. *P. venusta* is representative of the *varia*-group. The species described here to which it bears the closest affinity is *varia*.

***SASTRA* Baly**

(Figs 1, 15, 42–49, 77–82, Maps 1, 9)

Sastra Baly, 1865: 253; Chapuis, 1875: 198, 206; Maulik, 1936: 254 (description based on species from Asia,

transferred here to other genera); Gressitt & Kimoto, 1963: 404 (description based on single species incorrectly listed as Chinese due to data error). Type-species: *Sastra placida* Baly, by original designation.

Eriosardella Chujo, 1935: 219. Type-species: *Eriosardella costata* Chujo, by original designation. [Synonymized by Gressitt & Kimoto, 1963: 404.]

General form. Body elongate, elytra subparallel-sided (Fig. 1). Dorsum setose, elytron with sparse or dense, distinct setae throughout. Elytron more or less evenly convex, post-humeral sublateral longitudinal depression shallow to absent, derm more or less uniformly and densely punctured throughout. Length of antenna equal to at least three-quarters of body length, third segment at least 1·4× length of fourth segment and 2·0× that of second, all segments filiform, similar in both sexes. Eyes large and protuberant. Frons with sides distinctly convex, median area with a shallow depression or groove. Gena emarginate to eye. Pronotum either almost as broad as long or distinctly transverse, lateral margins evenly rounded in anterior half, maximum width not exceeding that of head plus eyes, distinctly less than that of elytra at humeri, primary setal pores distinctly tuberculate, dorsal depressions present, sublateral depressions shallow to well defined, each depression occupying at least two-thirds of area between disc and lateral margin, disc with a small anterior and posterior depression, anterior depression largest and usually better defined. Derm either with a vitreous reflection or dull without lustre, elytron very rarely metallic, sometimes a very weak submetallic lustre on humeral area in some species. Elytral epipleura present to at least apical quarter. Underside setose and finely punctured throughout. Fore coxal cavities open behind. Apex of abdomen in male with a deep triangular incision, evenly rounded in female. Legs slender, similar in both sexes, apices of tibiae with a comb-like row of short spines on the lateral edges, ventral spurs absent. Basal segment of fore tarsi in male slightly more enlarged than mid and hind, basal segment of fore and mid tarsi slightly shorter than length of segments 2 and 3 combined, basal segment of hind tarsus slightly longer than segments 2 and 3 combined. Claws distinctly bifid. Fully winged.

Diagnosis. Head with gena emarginate medially, emargination reaching anterior margin of eye (Fig. 15). Apical segment of maxillary palp conical, length slightly greater than that of preceding segment. Mandibles large and distinctly toothed. Labrum small and rounded anteriorly, not obscuring mandibles from above, width less than that of frons. Pseudoclypeus distinct, length not more than half that of labrum. Frons with sides distinctly convex, median area with a triangular depression or shallow groove extending from interantennal area, length not more than 1·5× that of antennal socket, anterior margin level with that of eyes. Eyes large and protuberant, length at least 3·5× that of antennal socket. Antennal sockets separated by less than width of a socket. Post-antennal swellings distinctly convex and elevated above level of vertex, confluent with frons between antennal sockets and delimited behind by a narrow horizontal groove. Vertex with a distinct coronal 'suture', derm either sparsely and indistinctly punctured or with an area of dense to confluent puncturation behind post-antennal swellings. Pronotum varying from almost as broad as long to distinctly transverse, maximum width and convexity in anterior half, lateral margins of anterior two-thirds evenly rounded, becoming straighter as pronotum narrows in posterior third, posterior margin sinuate, degree and density of puncturation variable, setae either sparse and indistinct or long and moderately dense, size and development of dorsal depressions variable. Elytron on average 3·4× longer than broad, surface more or less evenly convex (some species may have a very shallow transverse depression just behind humeral area and just above apical quarter), apices of elytra evenly rounded or with an apicosutural projection, maximum width in apical quarter. Underside minutely and densely punctured throughout, setae long and distinct, extending well beyond margins of punctures, metasternum convex with a narrow, shallow longitudinal groove, length at least 2·5× greater than that of mesosternum. Legs slender, length of hind leg plus tarsus slightly greater than that of elytron, fore and mid legs *c.* 1·5 mm shorter than hind leg, femora more or less of equal width, tibiae more or less straight, no sexual dimorphism, puncturation tending to become granulate towards apices, setae short and stout. Position in abdomen, and structure of male and female genitalia similar to that of *Polysastra*. Male aedeagus taking the form of a narrow tube, either with a spatulate apical region with a broad median orifice, or of fairly uniform width with a small median orifice and acute apex. Female genitalia very similar in structure to those of *Polysastra*, styli of similar, short rounded type.

Discussion. The present study shows that only nine of the 35 species included in *Sastra* by Wilcox (1971) were correctly assigned: these are listed below with their type-data. The remaining species that have not been assigned to new genera in this paper are listed (p. 256) with their new generic combinations.

Very little is known about the biology of *Sastra*. Specimens have been collected at various forms of light, including black light. An undescribed north Australian species was beaten from

dead branches by Dr G. B. Monteith during the day, and another undescribed species from Afore, Papua New Guinea was collected on Cardamom. Apart from these records no other bionomic data are known for this genus.

All the species remaining in *Sastra* are from the New Guinea region. In addition to the nine listed below I have examined more than 34 undescribed species, all from the same area (Map 1), indicating that the genus is restricted to the region. *S. costata* Chujo, described from a single specimen which bears the locality 'China', appears to have been incorrectly labelled as all other specimens examined of this species are from Irian Jaya. Enquiries and examination of Chinese Galerucinae material has not revealed further alleged specimens of this species from China.

Species remaining in *Sastra*

Sastra beccarii Jacoby

(Figs 49, 82, 110, Map 9)

Sastra beccarii Jacoby, 1886: 76. Holotype ♀, Irian Jaya: Hatam, vi.1875 (*Beccari*) (MIZSU) [examined].

Additional material examined

Irian Jaya: 1 ♀, Etnabaai, 1904; 1 ♀, Heuvel Bivak, 750 m, xi.[19]09 (*Lorentz*) (ITZ); 1 ♀, Central Mts, Archbold Lake, 760 m, 26.xi–3.xii.1961 (BPBM).

Japen Island: 1 ♂, R. Manai-Undei, 500 ft, x.1938 (*L. E. Cheesman*); 2 ♀, Japen Camp 2, Mt Eiori, 2000 ft, ix.1938 (*L. E. Cheesman*) (BMNH).

Sastra costata (Chujo)

(Figs 43, 78, 105, 106, Map 9)

Eriosardella costata Chujo, 1935: 219. Holotype ♀, 'China': (*Kraatz*) (IP) [examined].
Sastra costata (Chujo) Gressitt & Kimoto, 1963: 404 [genera synonymized].

Additional material examined

New Guinea: 1 ♂, N[ew Guinea] (*Wallace*); 1 ♀, New Guinea; 1 ♀, 1 ♀ (*Wallace*); 1 ♀ (no data) (BMNH); 1 ♂, 1 ♀, Ramoi, 'ging 12' (*L. M. D'Albertis*); 1 ♀, same data plus iv.[18]73; 1 ♀, New Guin[ea] (MCZ).

Sastra depressa Weise

(Figs 46, 79, 107, Map 9)

Sastra depressa Weise, 1917: 208. LECTOTYPE ♀, Irian Jaya: Bivak Elland, i.[19]10 (*Lorentz*) (ITZ), here designated [examined].

Additional material examined

Irian Jaya: 4 ♀ (paralectotypes), same data as lectotype (ITZ, MNHU) (1 ♀ without date); 1 ♂, 3 ♀ (paralectotypes), Noord River, ix.[19]09 (*Lorentz*) (ITZ, MNHU); 1 ♀, Noord Riv[er], 8.v.1907 (*Lorentz*) (ITZ). **Papua New Guinea**: 1 ♀, Fly River, x.ii.[18]95 (*L. M. D'Albertis*); 1 ♀, Paumomu Riv[er], ix–xii.[18]92 (*Loria*) (MCZ); 7 ♀, Karimui, 1080 m, 10–13.vii.1963 (*J. Sedlacek*); 1 ♀, same data except 1.v.1969; 1 ♀, Fly River, Oslobip, 100–600 m, viii.1969 (*J. Sedlacek*) (BPBM).

Sastra elegans Weise

(Figs 45, 104, Map 9)

Sastra elegans Weise, 1912: 437. Holotype ♂, Irian Jaya: Bivak Elland, x.[19]09 (*Lorentz*) (ITZ).

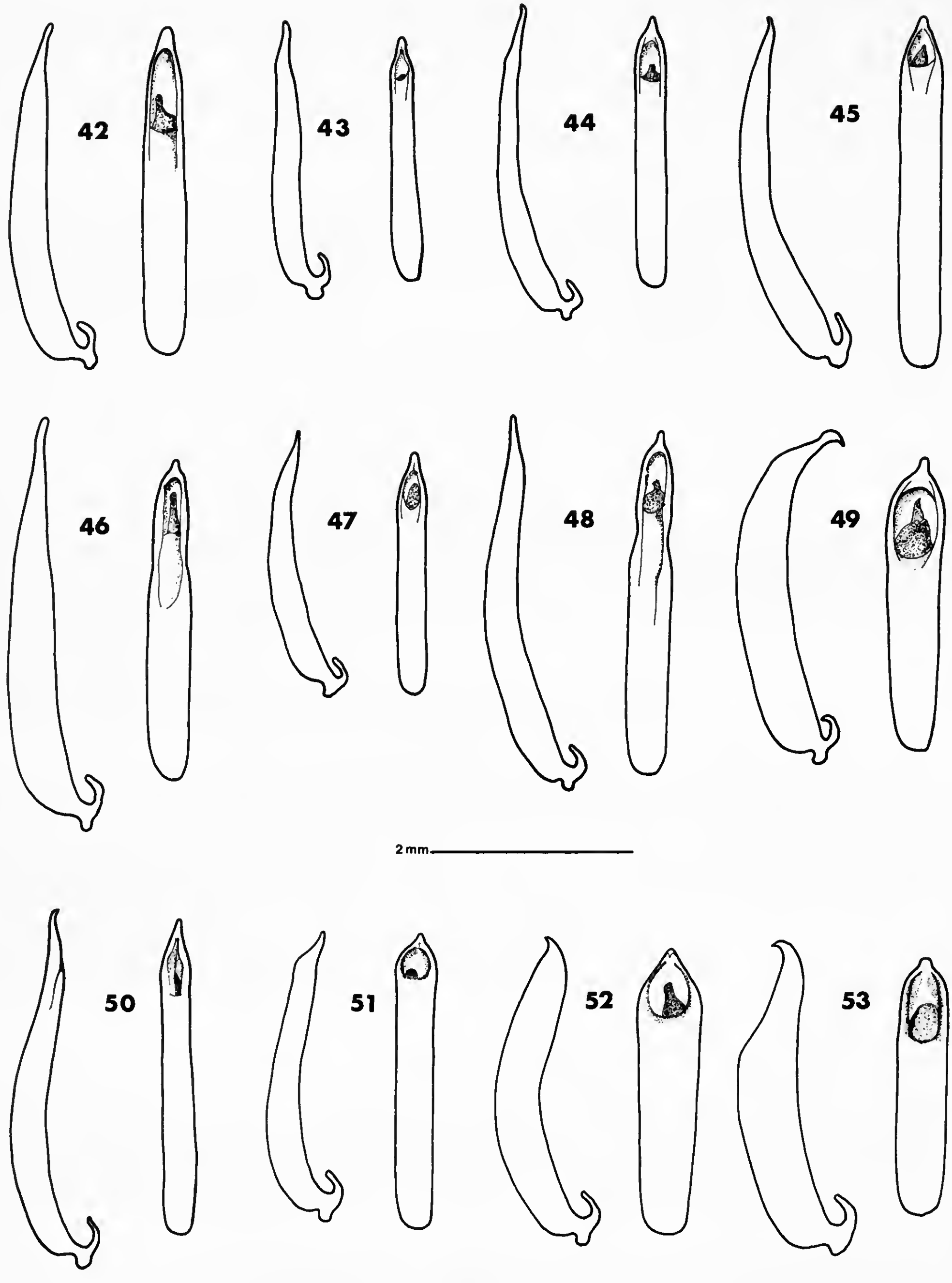
Sastra limbata Baly

(Figs 44, 111, 112, Map 9)

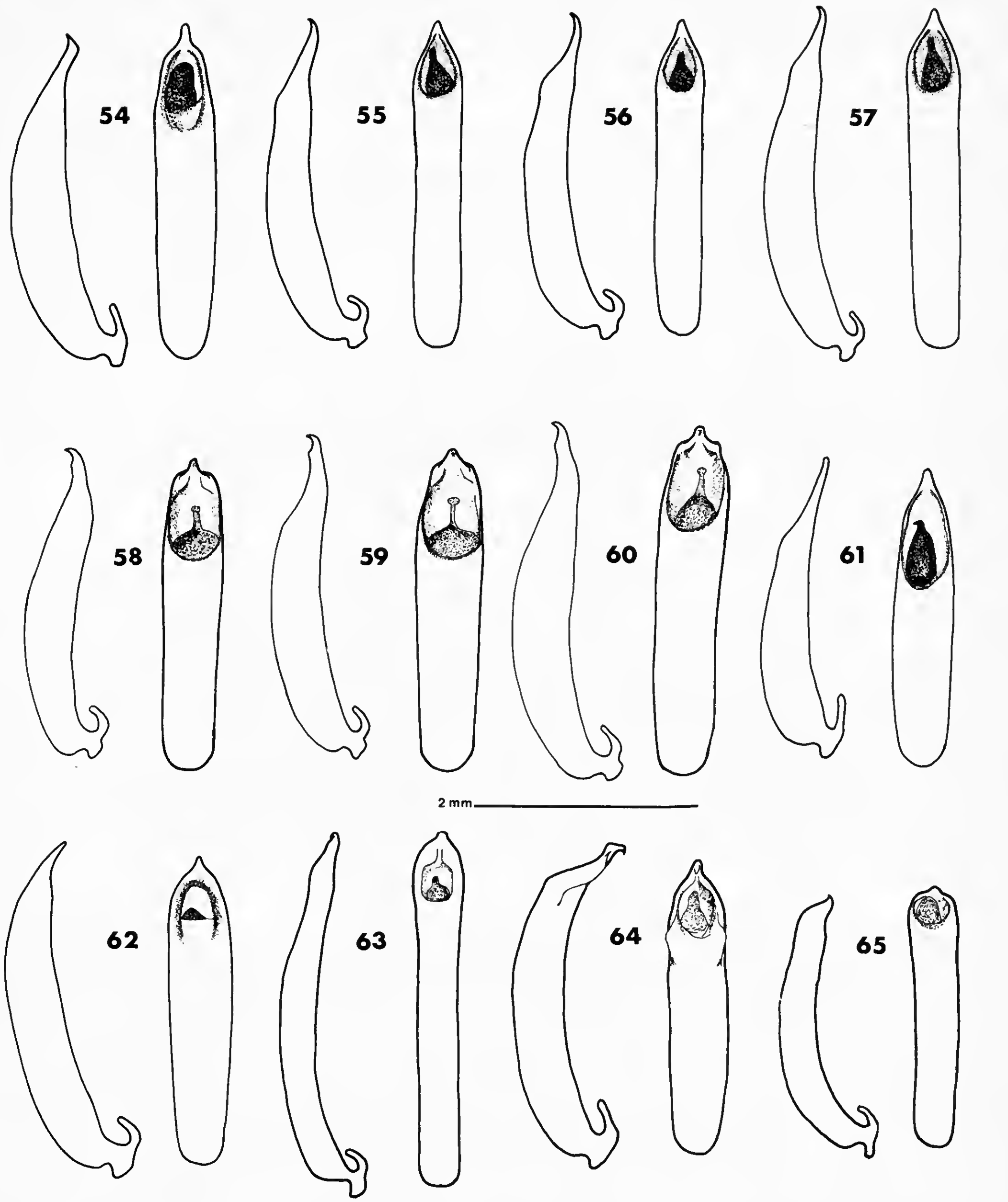
Sastra limbata Baly, 1865: 254. LECTOTYPE ♂, New Guinea (*Wallace*) (BMNH), here designated [examined].

Additional material examined

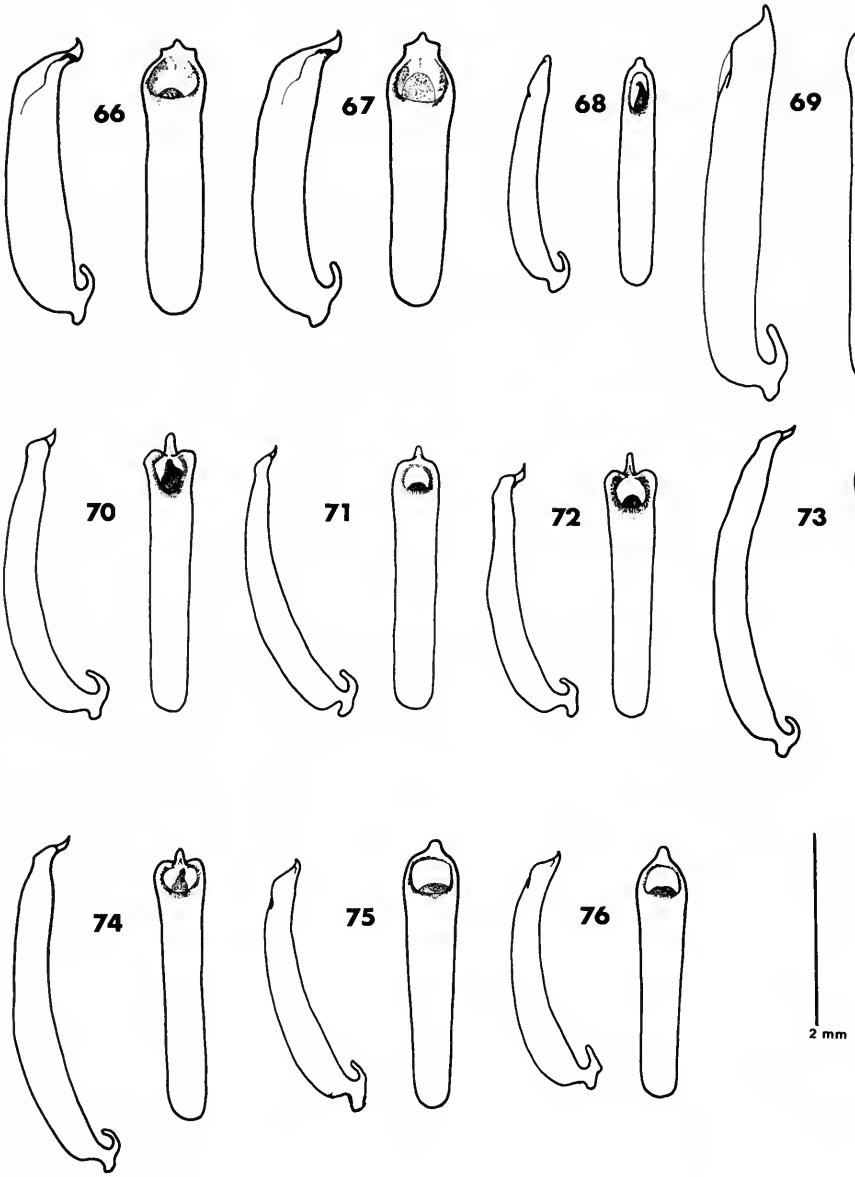
New Guinea: 2 ♂ (paralectotypes), same data as lectotype (BMNH).



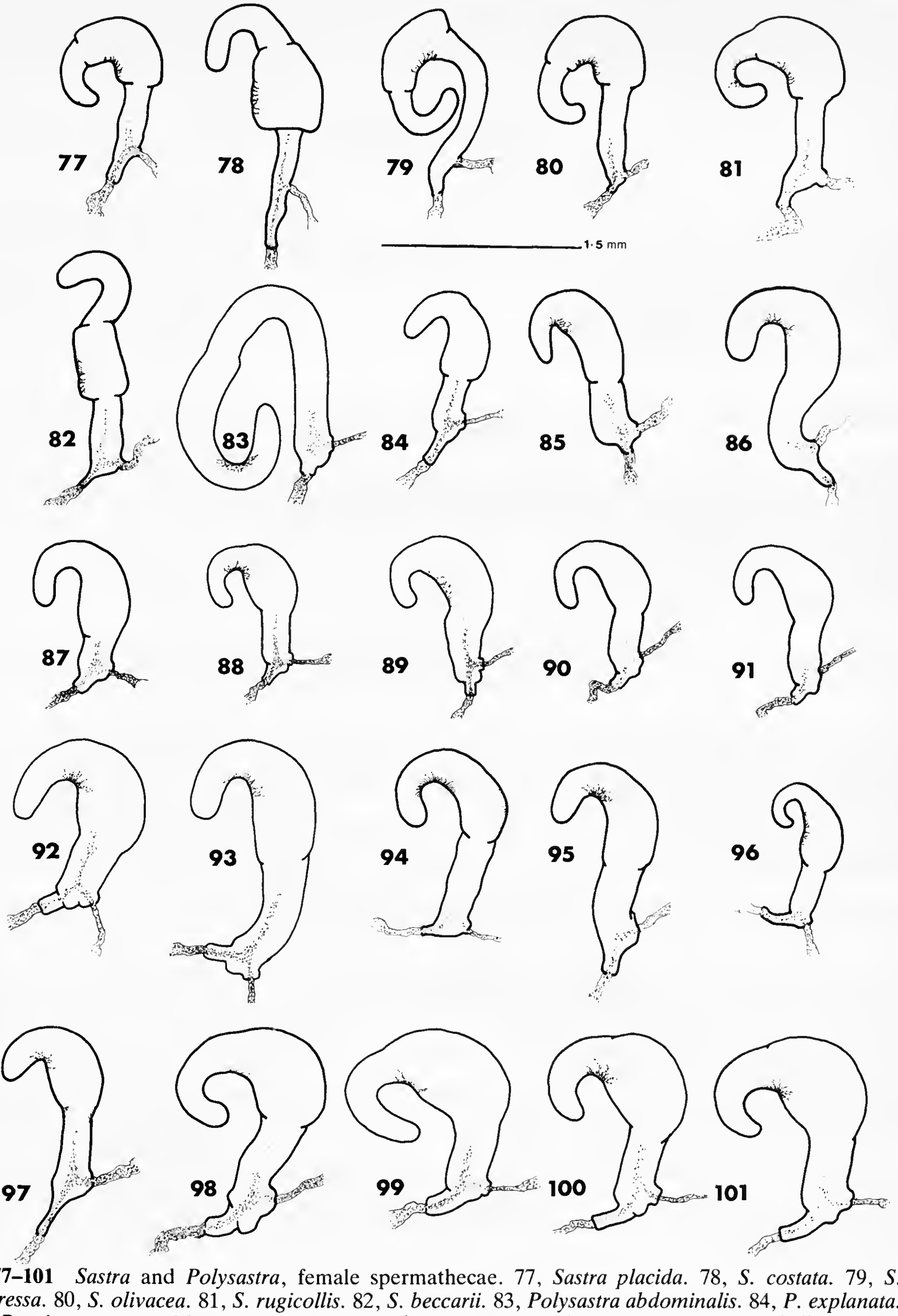
Figs 42–53 *Sastra* and *Polysastra*, aedeagi, dorsal and lateral view. 42, *Sastra olivacea*. 43, *S. costata*. 44, *S. limbata*. 45, *S. elegans*. 46, *S. depressa*. 47, *S. viridipennis*. 48, *S. rugicollis*. 49, *S. beccarii*. 50, *Polysastra abdominalis*. 51, *P. explanata*. 52, *P. micropunctata*. 53, *P. montana*.



Figs 54–65 *Polysastra,* aedeagi, dorsal and lateral view. 54, *P. sauvis.* 55, *P. metallica* (SE. form). 56, *metallica* (NW. form). 57, *P. metallica* (NE. form) (Map 7). 58, *P. varia* (P.N.G. form). 59, *P. varia* (NW.–NE. form). 60, *P. varia* (green highland form). 61, *P. venusta.* 62, *P. bicostata.* 63, *P. inhabilis.* 64, *P. sedlaceki.* 65, *P. duplicator.*



Figs 66–76 *Polysastra,* aedeagi, dorsal and lateral view. 66, *P. irregularis* (western form) (Map 5). 67, *P. irregularis* (eastern form). 68, *P. confusa*. 69, *P. fuscitarsis*. 70, *P. laetabilis*. 71, *P. obscuricornis*. 72, *P. costatipennis*. 73, *P. purpurasco purpurasco*. 74, *P. purpurasco viridis*. 75, *P. helleri* (NW. form). 76, *P. helleri* (NE. form) (Map 4).



Figs 77–101 *Sastra* and *Polysastra*, female spermathecae. 77, *Sastra placida*. 78, *S. costata*. 79, *S. depressa*. 80, *S. olivacea*. 81, *S. rugicollis*. 82, *S. beccarii*. 83, *Polysastra abdominalis*. 84, *P. explanata*. 85, *P. micropunctata*. 86, *P. montana*. 87, *P. obscuricornis*. 88, *P. costatipennis*. 89, *P. helleri*. 90, *P. purpurasco purpurasco*. 91, *P. purpurasco viridis*. 92, *P. fuscitarsis*. 93, *P. irregularis*. 94, *P. duplicator*. 95, *P. sedlaceki*. 96, *P. confusa*. 97, *P. inhabilis*. 98, *P. suavis*. 99, *P. metallica*. 100, *P. varia* (typical form). 101, *P. varia* (green highland form).

Sastra olivacea Jacoby

(Figs 42, 80, 109, Map 9)

Sastra olivacea Jacoby, 1904: 503. LECTOTYPE ♂, D'ENTRECASTEAUX ISLANDS: Fergusson Island (MCZ), here designated [examined].

ADDITIONAL MATERIAL EXAMINED

D'Entrecasteaux Islands: 1 ♂, 2 ♀ (paralectotypes), same data as lectotype (BMNH, MCZ). **Trobriand Islands**: 1 ♂, 1 ♀, Kriwini Island, iii.v.[18]95 (*A. S. Meek*) (MCZ).

Sastra placida Baly **sp. rev.**

(Figs 77, 102, Map 9)

Sastra placida Baly, 1865: 254. Holotype ♀, MYSOL: (*Wallace*) (BMNH) [examined; abdomen missing]. [Synonymised with *Sastra viridipennis* Boisduval by Weise, 1917: 208.]

ADDITIONAL MATERIAL EXAMINED

Mysol: 1 ♀ (*Wallace*) (BMNH); 1 ♀, 'Malaya pen.' (MCZ).

Sastra rugicollis Jacoby

(Figs 48, 81, 108, Map 9)

Sastra rugicollis Jacoby, 1904: 502. LECTOTYPE ♀, TROBRIAND ISLANDS: (*Loria*) (BMNH), here designated [examined].

ADDITIONAL MATERIAL EXAMINED

Trobriand Island: 1 ♀ (paralectotype), same data as lectotype (BMNH). **D'Entrecasteaux Islands**: 2 ♂, 2 ♀, Ferguson Island, ix, x, xi, xii.[18]94 (*A. S. Meek*) (MCZ).

Sastra viridipennis (Boisduval)

(Figs 47, 103, Map 9)

Galleruca viridipennis Boisduval, 1835: 559. Holotype ♀, NEW GUINEA (*D. Lesson*) (MIZSU) [examined].

ADDITIONAL MATERIAL EXAMINED

Irian Jaya: 1 ♂, Dorey (*Wallace*); 4 ♀, Dorey (BMNH, 1 MCZ) 2 ♂, Andai, 1892 (*W. Doherty*) (MCZ).

Nomen dubium

Sastra suturalis Jacoby

(Fig. 113)

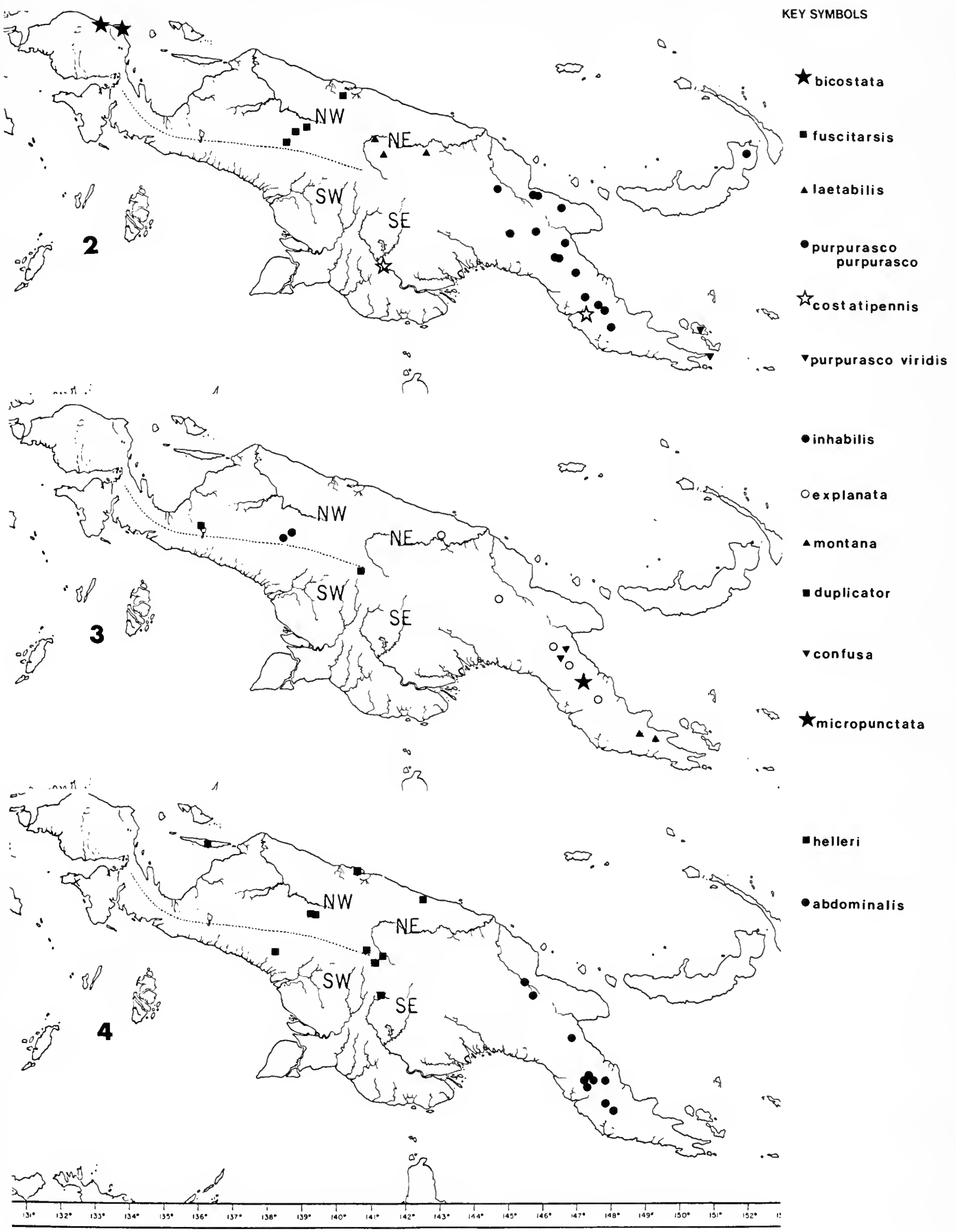
Sastra suturalis Jacoby, 1886: 75. ?Type ♀, AUSTRALIA (MCZ) [examined].

ADDITIONAL MATERIAL EXAMINED

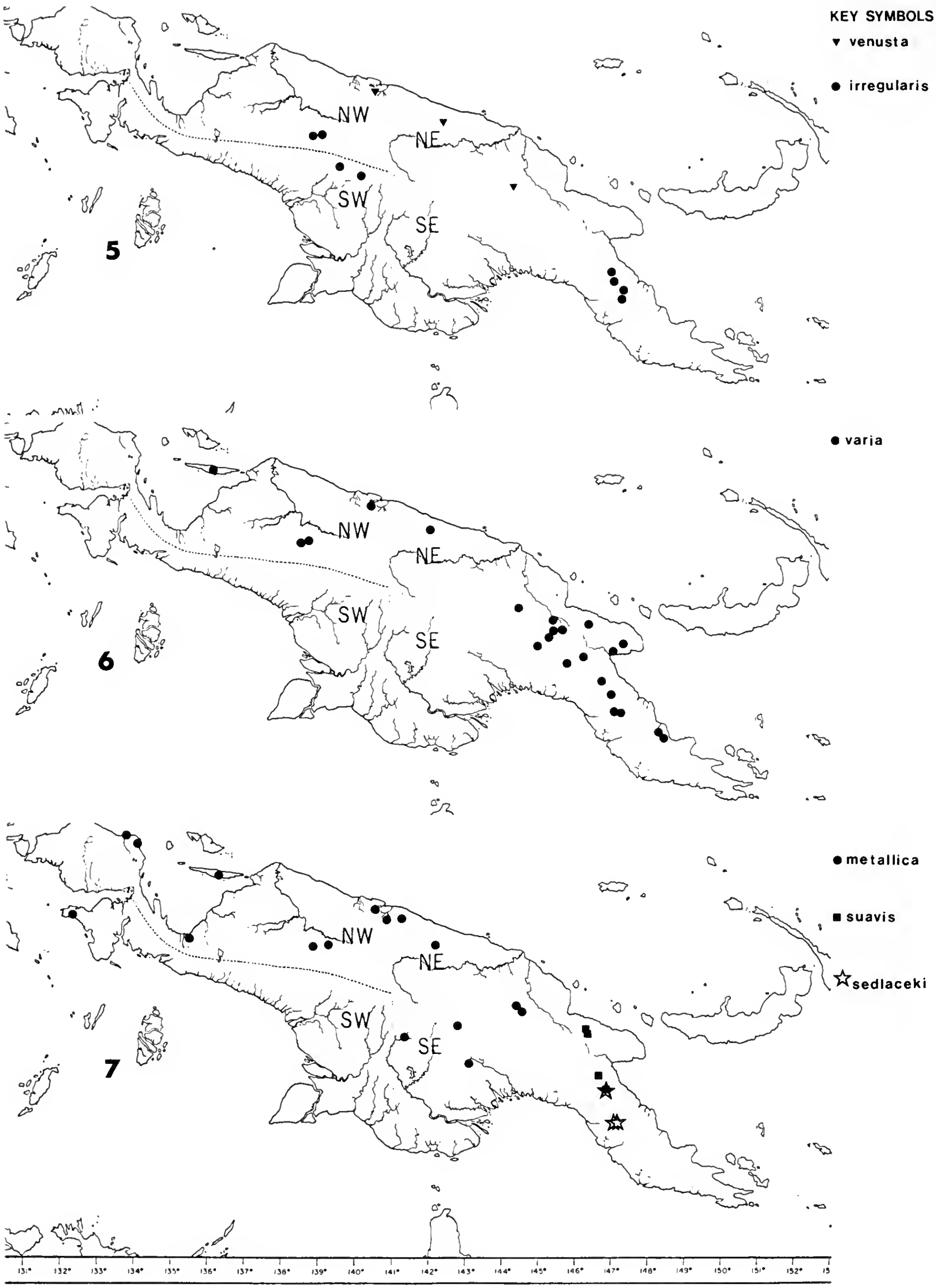
Australia: 2 ♀, Cooktown (BMNH).

COMMENTS. *S. suturalis* was described from Somerset, N. Queensland (*L. M. D'Albertis*). However the MCZ type-specimen labelled as being from the Jacoby collection bears no locality label or labels consistent with a D'Albertis specimen, and some uncertainty remains concerning its status.

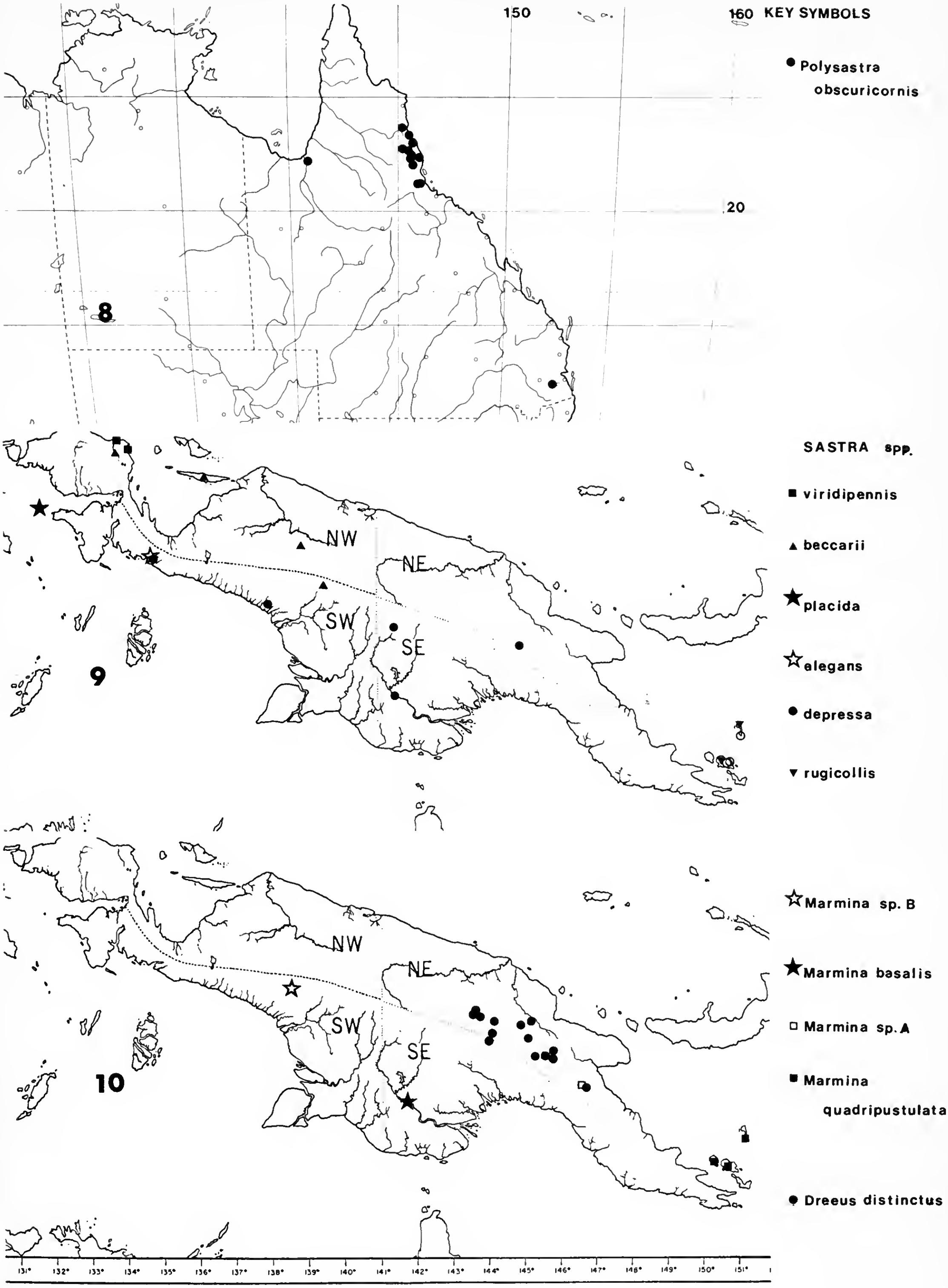
This species is provisionally retained in *Sastra* as it appears to belong to an undescribed genus near *Gallerucella*. No additional species congeneric with *suturalis* are known so it is not possible to establish the range of this genus.



Maps 2–4 Distribution of *Polysastra* species.



Maps 5–7 Distribution of *Polysastra* species.



Maps 8–10 Distribution of *Polysastra, Sastra, Marmina* and *Dreeus* species.

Species removed from *Sastra*

Coelocrania rubya (Maulik) **comb. n.**

Sastra rubya Maulik, 1936: 256. Holotype ♀, Burma: Ruby mines (*Doherty*) (BMNH) [examined].

Galerucella ceylonensis Jacoby **comb. rev.**

Galerucella ceylonensis Jacoby, 1887: 105: 105. Syntypes, Sri Lanka: 1 ♂, Dikoya, 3800–4200 ft, 6.xii.[18]81–16.i.[18]82 (*G. Lewis*); 1 ♀, (*G. Lewis*); (BMNH) [examined].
Sastra ceylonensis (Jacoby) Maulik, 1936: 261.

Galerucella lateralis Jacoby **comb. rev.**

Galerucella lateralis Jacoby, 1887: 106. Holotype ♀, Sri Lanka: (*G. Lewis*) (BMNH) [examined].
Sastra lateralis (Jacoby) Maulik, 1936: 258.

Galerucella marginata Jacoby **comb. rev.**

Galerucella marginata Jacoby, 1887: 107. Holotype ♀, Sri Lanka: Bogawantalawa, 4900–5200 ft, 21.iii.–4.iv.[18]82 (*G. Lewis*) (BMNH) [examined].
Sastra marginata (Jacoby) Maulik, 1936: 260.

Galerucella rugosa (Jacoby) **comb. n.**

Sastra rugosa Jacoby, 1886: 71. Type ♂, Sumatra: Singkara, x.1878 (*Beccari*) (MCZ) [examined].

Galerumaea flavomarginata (Jacoby) **comb. n.**

Sastra flavomarginata Jacoby, 1886: 74. Holotype ♀, New Guinea: Fly River (*L. M. D'Albertis*) (MCSN) [examined].

Momaea fasciata (Jacoby) **comb. n.**

Sastra fasciata Jacoby, 1886: 77. Syntype ♀, New Guinea: Ramoi, ii.1875 (*Beccari*) (MCZ) [examined].

Momaea meijerei (Weise) **comb. n.**

Sastra meijerei Weise, 1908: 320. Syntype ♀, New Guinea: Jamur (MNHU) [examined].

Sastracella fulvicornis (Jacoby) **comb. n.**

Sastra fulvicornis Jacoby, 1892: 958. Holotype ♀, Burma: Karen Mts (*Fea*) (MCSN) [examined].

Sastracella harmandi (Laboissière) **comb. n.**

Sastra harmandi Laboissière, 1932: 961. Holotype ♂, India: Sikkim (*Harmand*) (MNHN) [examined].

Sastroides acutipennis (Laboissière) **comb. n.**

Sastra acutipennis Laboissière, 1932: 960. Syntype ♂, India: Sikkim (*Harmand*) (MNHN) [examined].

Sastroides hirtipennis (Jacoby) **comb. n.**

Sastra hirtipennis Jacoby, 1891: 33. Holotype ♀, India: Assam (BMNH) [examined].

Sastroides metallescens (Jacoby) **comb. n.**

Sastra metallescens Jacoby, 1894: 304. Holotype ♀, Burma: Martapura, 1891 (*Doherty*) (MCZ) [examined].

Sastroides purpurascens (Hope) **comb. rev.**

Galleruca purpurascens Hope, 1831: 29. Holotype ♂, India (BMNH) [examined].

Gastroides [sic] *purpurascens* (Hope) Bryant, 1923: 146.
Momaea purpurascens (Hope) Weise, 1924: 69.
Sastra purpurascens (Hope) Maulik, 1936: 267.
Sastroides purpurascens (Hope) Bryant, 1937: 101.
Sastra purpurascens (Hope) Wilcox, 1971: 52.

Yulenia discoidalis (Baly) **comb. n.**

Sastra discoidalis Baly, 1886: 35. Syntypes 1 ♂, 1 ♀, Borneo: Sar[awak] (*Wallace*); 1 ♀, Malaya: Sing[apore] (*Wallace*) (BMNH) [examined].

Check list of genera, species and subspecies treated here

DREEUS **gen. n.**
- ***distinctus*** **sp. n.**

MARMINA **gen. n.**
- ***basalis*** (Jacoby) **comb. n.**
- ***quadripustulata*** (Jacoby) **comb. n.**

POLYSASTRA **gen. n.**
- ***abdominalis*** (Jacoby) **comb. n.**
- ***bicostata*** (Jacoby) **comb. n.**
- ***confusa*** **sp. n.**
- ***costatipennis*** (Jacoby) **comb. n.**
- ***duplicator*** **sp. n.**
- ***explanata*** **sp. n.**
- ***fuscitarsis*** **sp. n.**
- ***helleri*** (Weise) **comb. n.**
- ***inhabilis*** **sp. n.**
- ***irregularis*** **sp. n.**
- ***kampeni*** (Weise) **comb. n.**
- ***laetabilis*** (Weise) **comb. n.**
- ***metallica*** (Jacoby) **comb. n.**
  - *andaiensis* (Jacoby) **syn. n.**
- ***micropunctata*** **sp. n.**
- ***montana*** **sp. n.**
- ***obscuricornis*** (Blackburn) **comb. n.**
- ***purpurasco*** **sp. n.**
  - ***purpurasco purpurasco*** **subsp. n.**
  - ***purpurasco viridis*** **subsp. n.**
- ***rugulosa*** (Weise) **comb. n.**
- ***sedlaceki*** **sp. n.**
- ***suavis*** **sp. n.**
- ***varia*** **sp. n.**
- ***venusta*** **sp. n.**

SASTRA Baly
- ***beccarii*** Jacoby
- ***costata*** Chujo
- ***depressa*** Weise
- ***elegans*** Weise
- ***limbata*** Baly
- ***olivacea*** Jacoby
- ***placida*** Baly **sp. rev.**
- ***rugicollis*** Jacoby
- ***viridipennis*** (Boisduval)

Nomen dubium
- ***suturalis*** Jacoby

References

Allard, E. 1888. Synopsis des Galerucines à corselet sillonne transversalement. *Annales de la Société Entomologique de France* (6) **8**: 305–332.

Baly, J. S. 1865. Descriptions of new genera and species of Galerucidae. *Annals and Magazine of Natural History* (3) **16**: 247–255.

—— 1886. Descriptions of new genera and species of Galerucidae. *Transactions of the Entomological Society of London* **1886**: 27–39.

Blackburn, T. 1896. Further notes on the Australian Coleoptera with descriptions of new genera and species. *Transactions and Proceedings and Report of the Royal Society of South Australia* **20**: 35–109.

Bryant, G. E. 1923. Notes on synonymy in the Phytophaga (Coleoptera). *Annals and Magazine of Natural History* (9) **12**: 130–147.

—— 1937. Notes on Synonymy in the Phytophaga (Coleoptera). *Annals and Magazine of Natural History* (10) **20**: 97–101.

Boisduval, J. B. A. de 1835. *Voyage de decouvertes de L'Astrolabe faune Entomologique du L'Ocean Pacifique*, Part II, Coleoptères. 608 pp. Paris.

Chujo, M. 1935. Descriptions of a new genus and two new species of Chrysomelidae (Col.). *Arbeiten über morphologische und taxonomische Entomologie aus Berlin-Dahlem* **2**: 219–220.

Gressitt, J. L. & Kimoto, S. 1961. The Chrysomelidae of China and Korea. *Pacific Insects Monograph* Parts 1, 2, 1A, 1B.

Gressitt, J. L. & Hornabrook, R. W. 1977. Handbook of the common New Guinea Beetles. *Wau Ecology Institute, Handbook* no. 2. 87 pp.

Hope, F. W. 1831. Synopsis of the new species of Nepaul insects in the collection of Major General Hardwicke, pp. 21–32. *In* Gray, J. E., *The Zoological Miscellany*. London.

Jacoby, M. 1886. Description of new genera and species of phytophagous Coleoptera from the Indo-Malayan and Austro-Malayan sub-regions, contained in the Genoa Civic Museum. *Annali del Museo Civico di Storia Naturale*. **4**: 41–128.

—— 1887. Descriptions of the phytophagous Coleoptera of Ceylon obtained by Mr. George Lewis during the years 1881–1882. *Proceedings of the Zoological Society of London* **1887**: 65–118.

—— 1889. List of the phytophagous Coleoptera obtained by Signori Fea at Burmah and Tenasserim, with descriptions of the new species. *Annali del Museo Civico di Storia Naturale* **27**: 147–237.

—— 1892. Descriptions of the new genera and species of the phytophagous Coleoptera obtained by Sign. L. Fea in Burma. *Annali del Museo Civico di Storia Naturale* **32**: 869–999.

—— 1894. Descriptions of new genera and species of phytophagous Coleoptera obtained by W. Doherty in the Malayan archipelago. *Novitates Zoologicae* **1**: 267–330.

—— 1899. Descriptions of the new species of phytophagous Coleoptera obtained by Dr. Dohrn in Sumatra. *Entomologische Zeitung, Stettin* **60**: 259–364.

—— 1904. Descriptions of new genera and species of phytophagous Coleoptera obtained by Dr. Loria in New Guinea. *Annali del Museo di Storia Naturale* **41**: 498–504.

Knuth, P. 1909. *Handbook of flower pollination* **3**: 545–546. Oxford.

Laboissière, M. V. 1932. Galerucini de la collection du Muséum National D'Histoire Naturelle, recueillis dans L'Himalaya par le Dr. J. Harmand. *Bulletin du Muséum National d'Histoire Naturelle* **4**: 960–970.

Maulik, S. 1936. *The Fauna of British India including Ceylon and Burma*. Coleoptera, Chrysomelidae, Galerucinae, pp. 254–268. London.

—— Manuscript (on cards). *Alphabetical list of plants attacked by Chrysomelid beetles*. BMNH, London.

Sharp, D. & Muir, F. 1912. The comparative anatomy of the male genitalia tube in Coleoptera. *Transactions of the Entomological Society of London* **1912**: 477–642.

Varmer, K. K. 1969. Functional and developmental organs in the male of *Galerucella birmanica* Jacoby (Coleoptera: Chrysomelidae). *Annales des Sciences Naturelles* (Zoologie) **11**: 139–234.

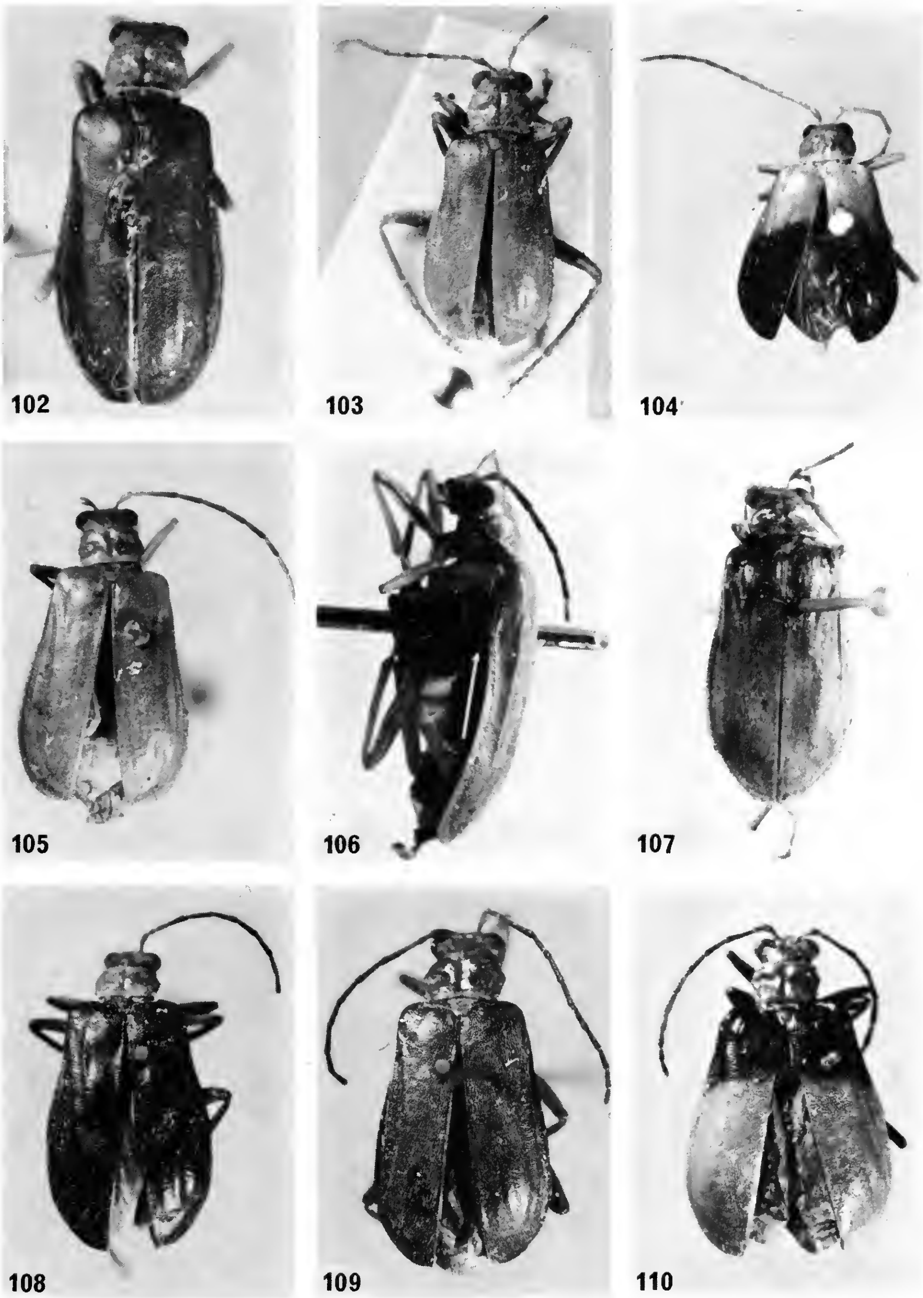
Weise, J. 1908. Resultats de l'expedition scientifique Nederlandaise à la Nouvelle-Guinee en 1903. Chrysomelidae. *Nova Guinea* **5**: 311–350.

—— 1912. Chrysomeliden und Coccinelliden. *Nova Guinea* **9**: 437–438.

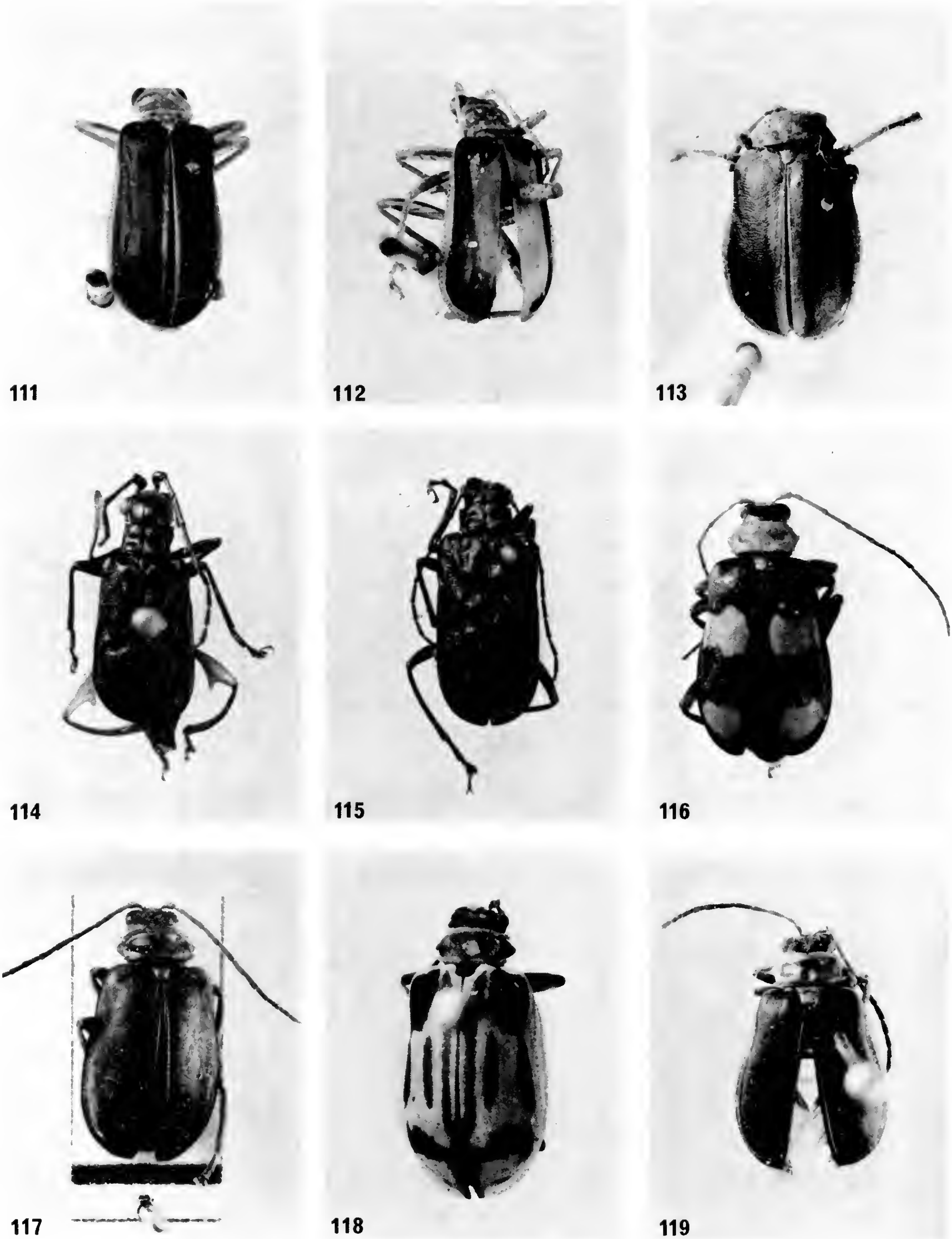
—— 1917. Chrysomeliden und Coccinelliden aus Nord Neu-Guinea. *Tijdschrift voor Entomologie* **60**: 192–224.

—— 1922. Chrysomeliden und Coccinelliden aus Queensland. *Arkiv für Zoologi* **15** (12): 1–150.

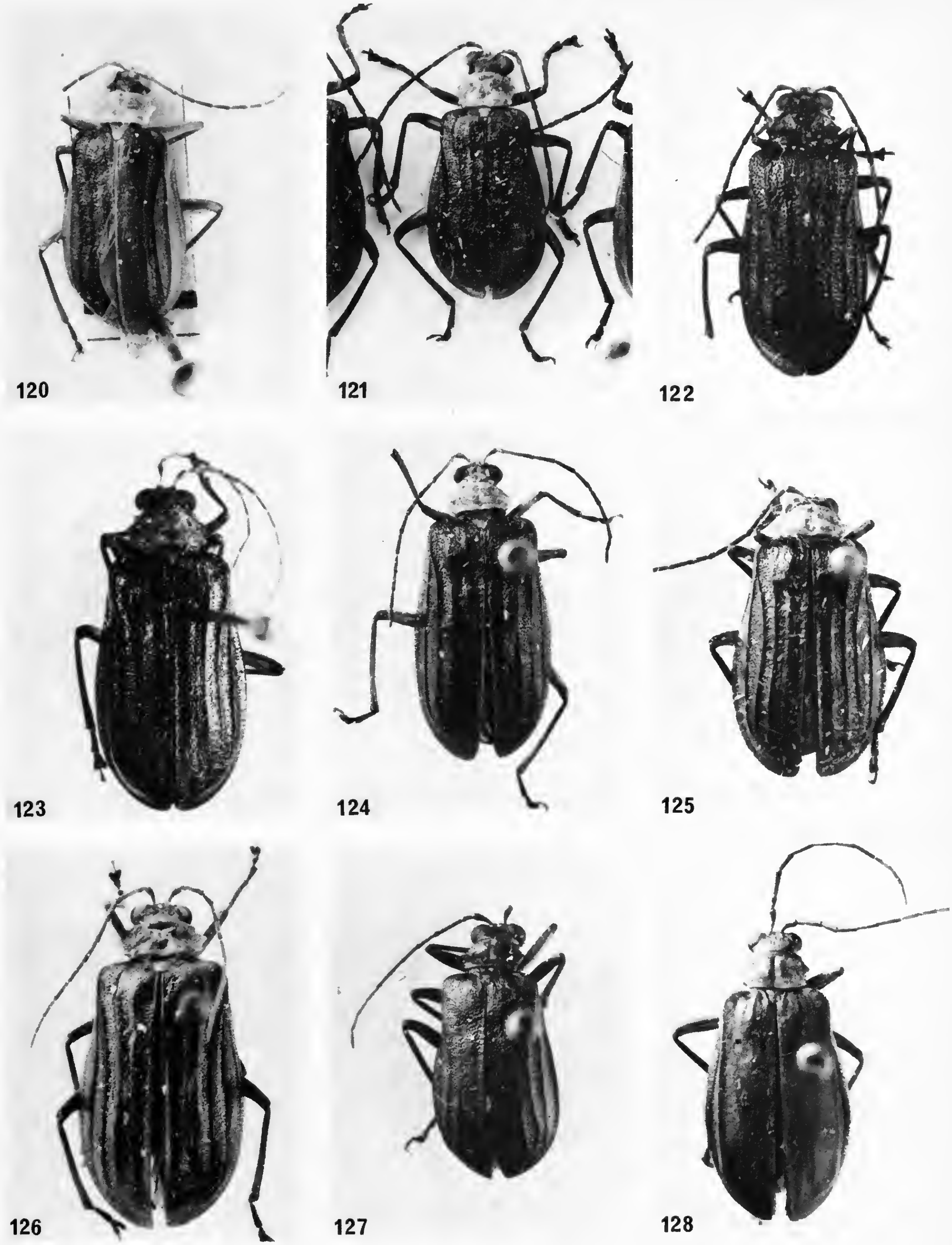
Wilcox, J. A. 1971. *Coleopterorum Catalogus*, supplementa Pars 78, Chrysomelidae: Galerucinae. Gravenhage.



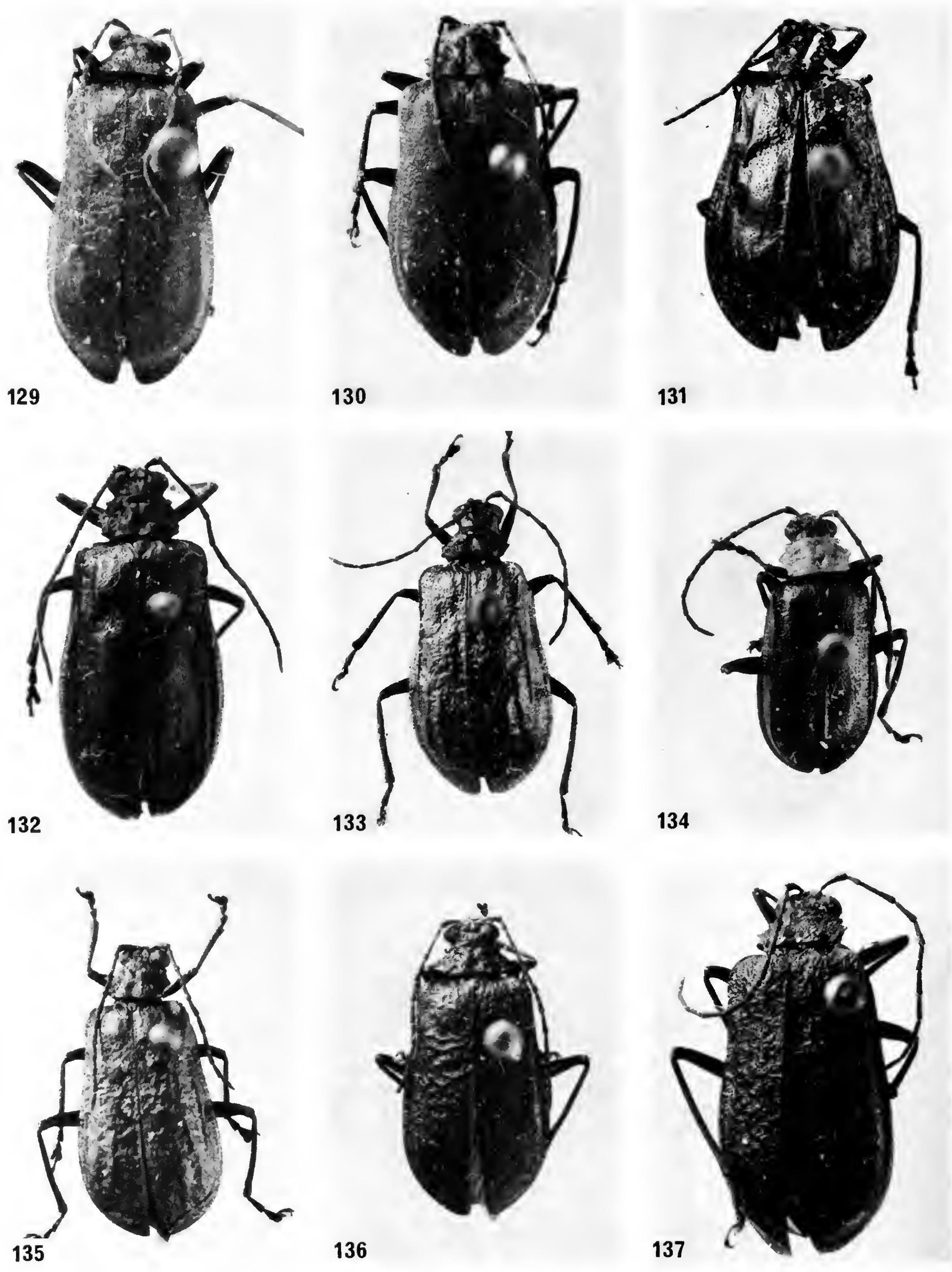
Figs 102–110 *Sastra.* 102, *S. placida* ♀, 6·5 mm. 103, *S. viridipennis* ♂, 7·5 mm. 104, *S. elegans* ♂, 9·1 mm. 105, *S. costata* ♀, 8·1 mm. 106, *S. costata,* showing emargination of epipleura. 107, *S. depressa* ♀, 10·1 mm. 108, *S. rugicollis* ♀, 9·1 mm. 109, *S. olivacea* ♀, 8·9 mm. 110, *S. beccarii* ♀, 8·5 mm.



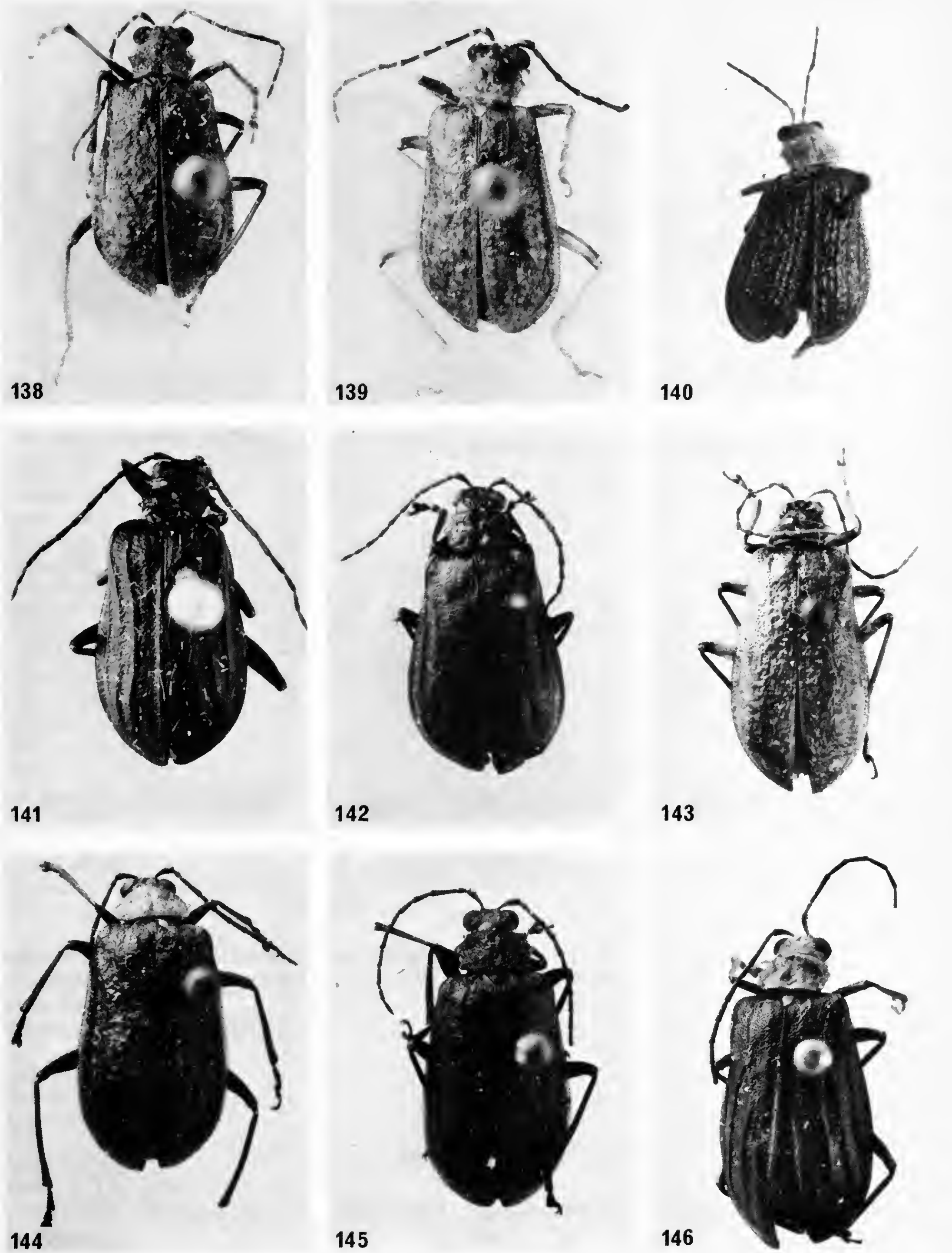
Figs 111–119 *Sastra,* genus A and *Marmina.* 111, 112, *Sastra limbata* ♀, 8·0 mm, showing two colour forms. 113, ?*S. suturalis,* 6·5 mm. 114, male of genus A. 115, female of genus A. 116, *Marmina quadripustulata* ♀, 10·1 mm. 117, *M. basalis* ♀, 9·1 mm. 118, *Marmina* sp. A ♂, 9·0 mm. 119, *Marmina* sp. B ♂, 7·5 mm.



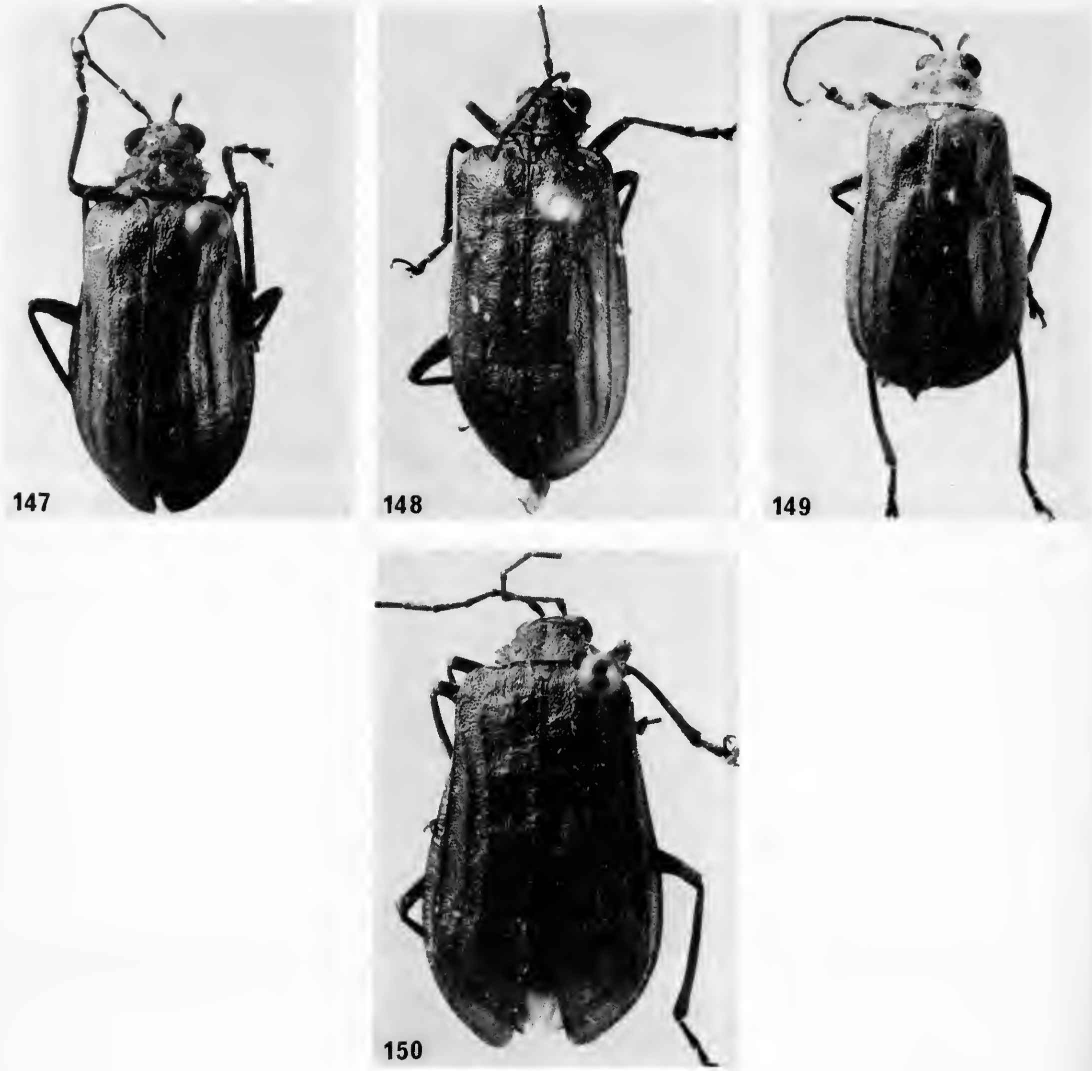
Figs 120–128 *Polysastra*. 120, *P. costatipennis* ♂, 7·1 mm. 121, *P. obscuricornis* ♂, 8·5 mm. 122, *P. helleri* ♀, 9·5 mm. 123, *P. laetabilis* ♀, 10·5 mm. 124, *P. purpurasco purpurasco* ♀, 11·0 mm. 125, *P. purpurasco viridis* ♀, 10·1 mm. 126, *P. fuscitarsis* ♀, 12·0 mm. 127, *P. venusta* ♂, 8·5 mm. 128, *P. explanata* ♀, 10·5 mm.



Figs 129–137 *Polysastra.* 129, *P. montana* ♀, 12·5 mm. 130, *P. micropunctata* ♀, 11·2 mm. 131, *P. sauvis* ♀, 11·5 mm. 132, *P. metallica* ♀, 12·5 mm. 133, *P.* sp. ♀, *metallica* subgroup 2, 11·2 mm. 134. *P.* sp. ♀, *metallica* subgroup 3, 10·2 mm. 135, *P. duplicator* ♀, 10·5 mm. 136, *P. irregularis* ♀, 10·2 mm. 137, *P. sedlaceki* ♀, 13·2 mm.



Figs 138–146 *Polysastra*. 138, *P. confusa* ♂, 7·8 mm. 139, *P.* sp. ♂ near *confusa*, 8·0 mm. 140, *P. rugulosa* ♀, 8·5 mm. 141, *P.* sp. ♀, *irregularis* subgroup 4, 8·1 mm. 142, *P.* sp. ♀, *irregularis* subgroup 5, 10·3 mm. 143, *P. inhabilis* ♀, 11·2 mm. 144, *P. abdominalis* ♀, 10·5 mm (pale form). 145, *P. abdominalis* ♀, 10·3 mm (dark form). 146, *P. varia* ♀, 11·3 mm (typical form).



Figs 147–150 *Polysastra*. 147, *P. varia* ♀, 12·0 mm (NW.–NE. metallic form). 148, *P. varia* ♀, 12·2 mm (NE. highland form). 149, *P. bicostata* ♀, 11·0 mm. 150, *P.* sp. ♀, *irregularis* subgroup 4, 13·5 mm.

Plant index

Index

British Museum (Natural History)

Blue butterflies of the Lycaenopsis-group

J. N. Eliot and A. Kawazoé

A definitive taxonomic study and revision of the *Lycaenopsis*-group of the Polyommatini, butterflies that occur throughout North America, Britain and northern Europe, Asia and the Orient to Japan, New Guinea and the Philippines.

This book will be a 'must' for lepidopterists interested in the Lycaenidae of the Holarctic and Oriental regions. The 560 figures include six pages of colour illustrating unique specimens and rarer species while the drawings of genitalia are of exceptional quality. There are keys and descriptions for identification to subspecific level, chapters on variation and a checklist.

296pp, 6pp colour illustrations, 560 figs
ISBN 0 565 00860 9
Hardback £28.00
Published by the British Museum (Natural History),
Cromwell Road, London SW7 5BD. May 1983.

Titles to be published in Volume 46

The generic and tribal classification of spore-feeding Thysanoptera (Phlaeothripidae: Idolothripinae).
By L. A. Mound & J. M. Palmer.

A revision of the Afrotropical mole-crickets (Orthoptera: Gryllotalpidae).
By B. C. Townsend.

Key to the genera of galerucine beetles of New Guinea, with a review of *Sastra* and related new taxa (Chrysomelidae).
By Sharon L. Shute.

The Afrotropical dacetine ants (Formicidae).
By Barry Bolton.

Photoset by Rowland Phototypesetting Ltd, Bury St Edmunds, Suffolk
Printed in Great Britain by Henry Ling Ltd., Dorchester

Bulletin of the
British Museum (Natural History)

The Afrotropical dacetine ants (Formicidae)

Barry Bolton

Entomology series
Vol 46 No 4 25 August 1983

The *Bulletin of the British Museum (Natural History)*, instituted in 1949, is issued in four scientific series, Botany, Entomology, Geology (incorporating Mineralogy) and Zoology, and an Historical series.

Papers in the *Bulletin* are primarily the results of research carried out on the unique and ever-growing collections of the Museum, both by the scientific staff of the Museum and by specialists from elsewhere who make use of the Museum's resources. Many of the papers are works of reference that will remain indispensable for years to come.

Parts are published at irregular intervals as they become ready, each is complete in itself, available separately, and individually priced. Volumes contain about 300 pages and several volumes may appear within a calendar year. Subscriptions may be placed for one or more of the series on either an Annual or Per Volume basis. Prices vary according to the contents of the individual parts. Orders and enquiries should be sent to:

Publications Sales,
British Museum (Natural History),
Cromwell Road,
London SW7 5BD,
England.

World List abbreviation: *Bull. Br. Mus. nat. Hist.* (Ent.)

The Entomology series is produced under the general editorship of the
Keeper of Entomology: Laurence A. Mound
Assistant Editor: W. Gerald Tremewan

ISSN 0524-6431

Entomology series
Vol 46 No 4 pp 267–416

British Museum (Natural History)
Cromwell Road
London SW7 5BD

Issued 25 August 1983

The Afrotropical dacetine ants (Formicidae)

Barry Bolton

Department of Entomology, British Museum (Natural History), Cromwell Road, London SW7 5BD

Contents

Synopsis

The nine genera (107 species) of Afrotropical dacetine ants are revised; keys to the genera and to the species of each genus are presented. The genus-level name *Miccostruma* Brown is newly synonymized with *Smithistruma* Brown, of which 35 species are recognized and 27 are described as new. Two species formerly placed in *Codiomyrmex* Wheeler are transferred to *Glamyromyrmex* Wheeler, of which a total of 11 Afrotropical species are described. Eleven species of *Serrastruma* are recognised of which five are new (one is an inquiline form). Six new synonyms are proposed in this genus and one previously synonymized name is returned to specific status. Four species of *Epitritus* Emery and two of *Microdaceton* Santschi are known, and one species each of *Quadristruma* Brown, *Cladarogenys* Brown and *Trichoscapa* Emery, the last recorded for the first time from sub-Saharan Africa. Of the 41 recognized Afrotropical *Strumigenys* Smith 23 are described as new in this paper and two previously synonymized names are returned to specific status.

Introduction

Modern taxonomic work on the dacetine ants dates back only to Brown (1948) who published a revisionary survey of the tribe as it was then understood. This was followed by a series of papers refining the ideas of the original study by defining some of the genera more accurately and delimiting other new genera (Brown, 1949*a*; 1949*b*; 1950*a*). During the course of these studies it was recognized that a number of genera originally placed with the dacetines did in fact constitute a separate but convergently similar tribe, the Basicerotini, which was established by

Bull. Br. Mus. nat. Hist. (Ent.) **46** (4): 267–416 Issued 25 August 1983

Brown (1949*c*). The genera of this tribe, whose members resemble the higher dacetines in many features, were later fully revised by Brown & Kempf (1960), with keyed additions to the Old World fauna by Taylor (1968*a*).

These pioneering studies of Brown were followed by a series of revisionary papers aimed at single dacetine genera or at the fauna of a particular region, along with many papers describing new species from all over the world. These last are too numerous to list here but the main generic and faunistic studies are as follows.

Acanthognathus, revised by Brown & Kempf (1969); *Epitritus*, keyed by Bolton (1972); *Glamyromyrmex* and *Gymnomyrmex*, keyed by Kempf (1960); *Kyidris*, discussed by Wilson & Brown (1956); *Mesostruma*, first revised by Brown (1952*b*) with later additions by Taylor (1973); *Neostruma*, revised by Brown (1959*b*); *Orectognathus*, revised by Brown (1953*b*) and later also by Taylor (1980, and included references); *Pentastruma*, discussed by Brown & Boisvert (1978); *Serrastruma*, revised by Brown (1952*a*); *Smithistruma*, revised by Brown (1953*a*; 1964); *Strumigenys* of the Afrotropical region, revised by Brown (1954), of the Neotropical region, revised by Brown (1962*b*, and included references), and a continuing series of papers revising the Indo-Australian fauna, the latest being Brown (1973*c*, and included references). A paper discussing the evolution of the dacetines, which also includes an ecological synopsis of the genera, has been produced by Brown & Wilson (1959). The Polynesian dacetine fauna is keyed by Wilson & Taylor (1967) and the fauna of Japan, China and Taiwan is treated by Brown (1949*a*). The entire Neotropical fauna has been catalogued by Kempf (1972) and the Nearctic fauna by Krombein *et al.* (1979). Dacetine ant larvae have been investigated by Wheeler & Wheeler (1954).

Apart from short notes included in some of the above references papers dealing with the biology of dacetine ants, either entirely or in part, include those of Brown (1950*c*), Carlin (1981), Creighton (1937), Dejean (1980*a*; 1980*b*), Hölldobler (1981), Kennedy & Schramm (1933), Weber (1952*b*), Wesson (1936), Wesson & Wesson (1939) and Wilson (1950, 1954, 1962).

On a world-wide basis 27 dacetine genera (384 species) are presently recognized, split into four subtribes which were first proposed and defined by Brown (1952*b*; 1953*a*), and later summarized by Brown & Wilson (1959). They are as follows.

Subtribe Dacetiti. Genera in which the eyes are dorsal or lateral and which lack antennal scrobes. The antennae have 11 segments and the palp formula is 5,3. This subtribe includes only the two small Neotropical genera *Daceton* and *Acanthognathus*.

Subtribe Orectognathiti. Contains only the Australian/New Guinean genus *Orectognathus* which has the eyes lateral and lacks antennal scrobes. The antennae have 5 segments and of the four funicular segments the second is the longest. The palp formula is 5,3.

Subtribe Epopostrumiti. The eyes are dorsolateral, placed above the scrobes when such are present. The antennae have 4 or 6 segments and of the funicular segments the second is not the longest. The palp formula is 5,3 or 3,2. Included here are the Afrotropical *Microdaceton* (PF 3,2), and the Australasian *Epopostruma, Mesostruma* and *Colobostruma* (all with PF 5,3).

Subtribe Strumigeniti. The eyes are ventrolateral, placed within or beneath the scrobes which are universally present though shallow and reduced in some. The antennae are 4 or 6 segmented and the apical segment is much the longest of the funiculars. The palp formula is 1,1.

This subtribe holds 19 of the 27 genera and is split into two groups based on the presence or absence of a spiniform apical fork on the mandibles. Those genera with the fork are termed strumigeniform (*Strumigenys, Neostruma, Quadristruma*), those without it smithistrumiform (*Asketogenys, Chelystruma, Cladarogenys, Codiomyrmex, Codioxenus, Dorisidris, Dysedrognathus, Epitritus, Glamyromyrmex, Gymnomyrmex, Kyidris, Pentastruma, Serrastruma, Smithistruma, Tingimyrmex, Trichoscapa*). The core-genera of this smithistrumiform group can be regarded as *Smithistruma, Trichoscapa* and *Pentastruma* together with their close relatives *Gymnomyrmex, Kyidris* and *Tingimyrmex*. In these genera the mandibles tend to be relatively short, basically triangular, dorsoventrally flattened structures which may be quite delicate, are not strongly downcurved, and in which the teeth are relatively small. The maximum number of teeth is usually 12 but rarely may be as high as 19, following a strongly differentiated basal

lamella. Mandibular variation in this complex includes reduction in number of teeth, variation in size and arrangement of teeth, modifications in the development of the basal lamella and the development in some of a diastema, of very variable extent, between the teeth and the basal lamella (Brown, 1948; 1949*a*; 1953*a*; 1964; Brown & Boisvert, 1978; Wilson & Brown, 1956; Kempf, 1960).

Modified away from these core-genera are several lines. In one of these the mandibles become more massively constructed and strongly downcurved, and usually accompanying this is a reduction in the number of teeth coupled with an increase in size in the teeth that remain (Brown, 1950*a*; 1953*a*). Basal to this complex seem to be *Chelystruma* and *Codiomyrmex* in which the mandibles are enlarged but a more or less full set of teeth is retained. Other genera included here are *Codioxenus, Glamyromyrmex* and *Dorisidris*, the last showing a secondary elongation of the mandibles, the second with marked variation in the number of teeth present.

A second line, represented by *Serrastruma* and *Cladarogenys*, shows an elongation of the mandibles but with retention of their basically triangular shape. In these the teeth are initially reduced and incorporated in a long series of denticles. The long basal lamella also becomes denticulate and is pressed into service as part of the masticatory margin (*Serrastruma*; Brown, 1952*a*). Further elongation of the blades coupled with a secondary reduction in dentition gives the condition seen in *Cladarogenys* (Brown, 1976).

A third line shows elongation of the mandibles with eventual loss of the triangular shape and their development into long narrow blades. This line, including *Dysedrognathus* and *Epitritus*, was postulated by Taylor (1968*b*). It involves an initial increase in mandible length coupled with an increase in the number of teeth. With continuing increase in length the teeth on the main part of the blade become spaced out or lost and only those crowded near the apex remain.

The last smithistrumiform genus to be considered here, *Asketogenys*, appears to be an independent relatively long-mandibulate derivative of *Smithistruma* in which the teeth at about the midlength of the masticatory margin have been enlarged (Brown, 1972).

Finally there is the anomalous Neotropical genus *Phalacromyrmex* and an apparently related undescribed genus from the Indo-Australian region which do not fit any of the above subtribes. At first glance they appear to fall into the smithistrumiform group but they have 9–11 antennal segments, a palp formula of 3,2 (*Phalacromyrmex*), and lack other characters which may be considered as typically smithistrumiform such as spongiform appendages on the pedicel segments, a transverse lamellar or spongiform strip across the base of the first gastral tergite and a basal lamella on their massively constructed bear trap-like mandibles. Indeed, the massive mandibles seen in these genera are reminiscent of some *Glamyromyrmex* species but also have some resemblance to the Malagasy genus *Pilotrochus* Brown, so there is a very strong possibility that *Phalacromyrmex* and its undescribed relative may be convergent on the smithistrumiform dacetines from some other part of the Myrmicinae.

The distribution of the 27 genera includes all the zoogeographical regions, but dacetines are absent from the northern parts of the Palaearctic and Nearctic. Three of the genera are very widespread (*Smithistruma, Strumigenys, Epitritus*) and two small genera include efficient tramp-species (*Quadristruma, Trichoscapa*) whose members have been introduced by human commerce over much of the tropical and subtropical zones. Of the remaining 22 genera nine are restricted to the Neotropical region, two to the Afrotropical, one to the Oriental, two to the Indo-Australian and two to the Australasian region. The remaining six genera are shared by two, usually adjacent, zoogeographical regions.

The table below summarizes the number of described dacetine species of the world and indicates their distribution. For the purposes of this study the Afrotropical and Malagasy are regarded as separate regions and in the table the Indo Australian region is taken to include New Guinea and the Pacific island systems. Tramp-species or species shared by two regions are entered in the table only in their presumed region of origin. Thus *Serrastruma ludovici* (Forel), *S. simoni* (Emery), *Strumigenys scotti* Forel, *St. rogeri* Emery, *Quadristruma emmae* (Emery), and *Trichoscapa membranifera* (Emery) are all recorded in the Afrotropical column alone, although all have been found in other parts of the world. *Smithistruma dubia* Brown is recorded as Indo-Australian although also present in Australia.

Genus-level names which are now regarded as synonyms are excluded from the table. Apart from those listed in this paper under the appropriate generic headings, the following are recognized synonyms.

Alistruma Brown is a synonym of *Colobostruma*. [Synonymy by Brown, 1959*c*.]
Arnoldidris Brown is a synonym of *Orectognathus*. [Synonymy by Brown, 1973*b*.]
Clarkistruma Brown is a synonym of *Colobostruma*. [Synonymy by Brown, 1959*c*.]
Hexadaceton Brown is a synonym of *Epopostruma*. [Synonymy by Brown, 1973*b*.]
Polyhomoa Azuma is a synonym of *Kyidris*. [Synonymy by Brown & Yasumatsu, 1951.]

The fossil genus *Hypopomyrmex* Emery, formerly considered a dacetine, has been re-examined by Brown & Carpenter (1978) and excluded from the tribe.

In the table the zoogeographical regions are abbreviated as follows. Af. Afrotropical, Au. Australasian, In. Indo-Australian, Ma. Malagasy, Ne. Nearctic, No. Neotropical, Or. Oriental, Pa. Palaearctic.

Genus	Ne.	No.	Pa.	Af.	Ma.	Or.	In.	Au.	Total
Acanthognathus Mayr	–	6	–	–	–	–	–	–	6
Asketogenys Brown	–	–	–	–	–	–	1	–	1
Chelystruma Brown	–	1	–	–	–	–	–	–	1
Cladarogenys Brown	–	–	–	1	–	–	–	–	1
Codiomyrmex Wheeler	–	2	–	–	–	–	–	2	4
Codioxenus Santschi	–	1	–	–	–	–	–	–	1
Colobostruma Wheeler	–	–	–	–	–	–	1	8	9
Daceton Perty	–	1	–	–	–	–	–	–	1
Dorisidris Brown	–	1	–	–	–	–	–	–	1
Dysedrognathus Taylor	–	–	–	–	–	–	1	–	1
Epitritus Emery	–	–	1	4	–	1	1	–	7
Epopostruma Forel	–	–	–	–	–	–	–	4	4
Glamyromyrmex Wheeler	–	7	–	11	–	–	–	–	18
Gymnomyrmex Borgmeier	–	6	–	–	–	–	–	–	6
Kyidris Brown	–	–	–	–	–	2	2	–	4
Mesostruma Brown	–	–	–	–	–	–	–	6	6
Microdaceton Santschi	–	–	–	2	–	–	–	–	2
Neostruma Brown	–	6	–	–	–	–	–	–	6
Orectognathus Smith	–	–	–	–	–	–	10	19	29
Pentastruma Forel	–	–	–	–	–	2	–	–	2
Phalacromyrmex Kempf	–	1	–	–	–	–	–	–	1
Quadristruma Brown	–	–	–	1	–	–	1	–	2
Serrastruma Brown	–	–	–	11	–	–	–	–	11
Smithistruma Brown	24	19	3	35	–	5	11	–	97
Strumigenys Smith	1	54	–	41	1	8	48	8	161
Tingimyrmex Mann	–	1	–	–	–	–	–	–	1
Trichoscapa Emery	–	–	–	1	–	–	–	–	1
Total	25	106	4	107	1	18	76	47	384

Discounting papers whose sole purpose was the mass description of new forms the history of Afrotropical dacetine studies prior to Brown's (1948) publication consisted only of the monographic study of South African ants by Arnold (1917), the catalogue of Wheeler (1922) and the key presented by Santschi (1913*a*). Arnold and Wheeler both recognized three genera in the Afrotropical region, *Microdaceton, Strumigenys* and *Epitritus*, of which only the first has remained unchanged to the present day.

The genus *Strumigenys*, as recognized by Wheeler (1922), contained not only the long-mandibulate forms with a spiniform apical fork which constitute the genus as it is presently understood, but also a number of short-mandibulate species which lacked an apical fork and which were grouped under a subgenus *Cephaloxys*. Brown (1948) recognized that these short-mandibulate forms were fundamentally different from the foregoing group and also noted

that *Cephaloxys*, beside being a preoccupied name, itself contained two disparate groups of species which differed consistently in the structure of their mandibles. Erecting *Smithistruma* to replace the name *Cephaloxys*, Brown (1948) proceeded to remove those African species which had multi-denticulate mandibles to a separate subgenus of *Smithistruma, Serrastruma*, which he later elevated to generic status (Brown, 1949*a*) and then revised both genera (Brown, 1952*a*, 1953*a*).

The two African species placed in *Epitritus* by their original authors and retained there by Wheeler (1922) were recognized by Brown (1948) as falling outside the limits of that genus. He transferred them to a separate genus, *Miccostruma*, which is now regarded as a synonym of *Smithistruma* (see discussion of that genus). True *Epitritus* was later discovered in Africa (Brown, 1962*a*) and four species are now known from that continent. Brown (1953*a*) described a species of *Codiomyrmex* from Africa, and Taylor (1965) another. These two, plus nine newly discovered species, are best referred to *Glamyromyrmex* as noted under the discussion of that genus. Finally, species of *Quadristruma* and *Trichoscapa* have been recorded from Africa, the former by Bolton (1973), the latter newly reported here; and the monotypic genus *Cladarogenys* has recently been described by Brown (1976).

Thus the Afrotropical region currently has nine dacetine genera containing a total of 107 species. The vast majority of these are found in the leaf litter and topsoil layers where they constitute an important fraction of the fauna. Nests are made either in compressed leaf litter, in the soil, or in pieces of wood or stumps embedded in the litter and topsoil layers. A couple of *Strumigenys* species are known which nest and forage arboreally and some *Serrastruma* may ascend tree trunks to a considerable distance above the ground.

This study of the dacetine ants of sub-Saharan Africa is the latest part in a series of papers aimed towards a revision of the entire myrmicine ant fauna of the Afrotropical region. Previously published parts include Bolton (1974; 1976; 1980; 1981*a*; 1981*b*; 1982).

Measurements and indices

Total Length (TL). The total outstretched length of the ant from the mandibular apex to the gastral apex.

Head Length (HL). The length of the head proper, excluding the mandibles, measured in a straight line from the mid-point of the anterior clypeal margin to the mid-point of the occipital margin, in full-face view. In species where the clypeal margin or the occipital margin (or both) is concave the measurement is taken from the mid-point of a transverse line spanning the anteriormost or posteriormost projecting points respectively

Head Width (HW). The maximum width of the head in full-face view, measured behind the eyes. (In *Microdaceton* ignoring the projecting tubercles.)

Cephalic Index (CI). $\frac{HW \times 100}{HL}$

Mandible Length (ML). The straight-line length of the mandible, measured in the same plane for which the HL measurement is taken, from the mandibular apex to the transverse through the anteriormost point or points of the clypeal margin.

Mandibular Index (MI). $\frac{ML \times 100}{HL}$

Scape Length (SL). The maximum straight-line length of the antennal scape excluding the basal constriction or neck close to the condylar bulb. (In *Epitritus* measured from the tip of the subbasal lobe to the scape apex.)

Scape Index (SI). $\frac{SL \times 100}{HW}$

Pronotal Width (PW). The maximum width of the pronotum in dorsal view.

Alitrunk Length (AL). The diagonal length of the alitrunk in profile from the point at which the pronotum meets the cervical shield to the posterior base of the metapleuron.

Abbreviations of depositories

AMNH	American Museum of Natural History, New York, U.S.A.
BMNH	British Museum (Natural History), London, U.K.
CAS	California Academy of Sciences, San Francisco, California, U.S.A.
ENSA	École Nationale Supérieure Agronomique, Toulouse, France.
IE	Istituto di Entomologia del'Università, Bologna, Italy.
MCSN	Museo Civico di Storia Naturale 'Giacomo Doria', Genoa, Italy.
MCZ	Museum of Comparative Zoology, Cambridge, Massachusetts, U.S.A.
MHN	Muséum d'Histoire Naturelle, Geneva, Switzerland.
MNHN	Muséum National d'Histoire Naturelle, Paris, France.
MNHU	Museum für Naturkunde der Humboldt-Universität, Berlin, Germany (D.D.R.).
MRAC	Musée Royal de l'Afrique Centrale, Tervuren, Belgium.
NMB	Naturhistorisches Museum, Basle, Switzerland.
NMV	Naturhistorisches Museum, Vienna, Austria.
SAM	South African Museum, Cape Town, South Africa.
TM	Természettudományi Múzeum, Budapest, Hungary.
USNM	United States National Museum, Washington, D.C., U.S.A.

Diagnosis of Afrotropical dacetine ants

WORKER. Myrmicine ants in which the antennae have only 4 or 6 segments, the funiculus ending in a 2-segmented club. Pedicel segments with spongiform or lamelliform appendages; sometimes the appendages small but always present (Figs 13, 16, 22, 30, 38–44, 68–70, 77, 78, 80, 81). Mandibles of two basic forms, either produced into a pair of long narrow linear blades (Figs 45–67, 71–79) with or without an apical fork of spiniform teeth, or the mandibles shorter, usually subtriangular, always lacking an apical fork and armed with 8–>30 teeth or denticles (Figs 1–12, 14, 15, 17–21, 23–37). Clypeus broad and shield-like, broadly inserted between the widely separated frontal lobes; the latter sometimes projecting beyond the lateral margins of the head. Palp formula usually 1,1 but higher in *Microdaceton* (PF 3,2). Antennal scrobes usually present (not in *Microdaceton*, Figs 78, 79), situated above the eye, the latter generally small to moderate in size and commonly on the ventrolateral margin of the head. Propodeum usually with a pair of teeth or spines, rarely otherwise. Bizarre pilosity frequently developed.

Among the Afrotropical myrmicine ants the dacetines are easily identified by their low antennomere count of 4 or 6 and their possession of spongiform or lamellate appendages on the pedicel segments. Only one other genus in the region has an antennomere count as low as 6, *Melissotarsus* Emery, but this differs from the dacetine genera as follows.

Dacetine genera	*Melissotarsus*
Spongiform or lamellate appendages present on pedicel segments.	Spongiform or lamellate appendages absent from pedicel segments.
Frontal lobes widely separated, situated laterally on anterior half of head.	Frontal lobes confluent, situated centrally and high on dorsum of head.
Clypeus projecting back between frontal lobes.	Clypeus not projecting back between frontal lobes.
Mandibles blade-like or subtriangular; if the latter then always with more than 4 teeth.	Mandibles short, at most with 4 teeth, the apical long and finger-like when unworn.
Antennal scrobes present except in *Microdaceton* but here the mandibles are linear.	Antennal scrobes absent.
Propodeum usually armed with a pair of spines or teeth, often with a strong infradental lamella.	Propodeum evenly rounded and unarmed.
Anterior coxae as large as or larger than the middle and hind coxae.	Anterior coxae much smaller than the massively developed middle and hind coxae (Bolton, 1982: 334, fig. 23).

Dacetine genera – *cont.*
Basitarsal leg segments not swollen, without an apical circlet of teeth on the anterior edge of the middle and hind basitarsi.

Melissotarsus – cont.
Basitarsal leg segments greatly swollen, with an apical circlet of teeth on the anterior edge of the middle and hind basitarsi.

Key to Afrotropical dacetine ant genera (workers)

1 Mandibles elongate and linear, produced into narrow projecting blades (Figs 45–67, 71–79): never triangular/subtriangular, never serially multidentate or denticulate 2

– Mandibles triangular or subtriangular, not produced into narrow projecting blades; apical (masticatory) margin serially multidentate or denticulate but teeth sometimes reduced (Figs 1–15, 17–37) 6

2 Apex of each mandibular blade armed with a fork of 2 or 3 spiniform teeth set in a more or less vertical series, with or without intercalary denticles between the spiniform fork teeth (Figs 49–67, 71–79) 3

– Apex of each mandibular blade either with a single long tooth at the dorsal apex subtended by a series of minute denticles, or with a series of minute denticles only (Figs 45–48) 5

3 Apical fork of mandibles with 3 spiniform teeth; blades of mandibles without preapical teeth. Maxillary palp 3-segmented. Antennal scrobes absent, the eyes dorsolateral. Petiole node with a pair of teeth or short spines, postpetiole with lamellate appendages (Figs 78–81) ***MICRODACETON*** (p. 401)

– Apical fork of mandibles with 2 spiniform teeth; blades of mandibles usually with preapical teeth. Maxillary palp 1-segmented. Antennal scrobes present, the eyes ventrolateral. Petiole node unarmed, postpetiole with spongiform appendages (Figs 49–77) 4

4 Antennae with 4 segments (Fig. 67) .... ***QUADRISTRUMA*** (p. 400)

– Antennae with 6 segments .... ***STRUMIGENYS*** (p. 358)

5 Antennal scapes with a broad anteriorly projecting subbasal lobe. Clypeal margin with spatulate or strap-like projecting hairs. Head with large orbicular hairs present; the head broad, CI>100 (Figs 46–48) .... ***EPITRITUS*** (p. 354)

– Antennal scapes linear, without a projecting lobe. Clypeal margin without spatulate or strap-like projecting hairs. Head only with simple hairs present; the head narrower, CI<80 ***CLADAROGENYS*** (p. 353)

6 Differentiated prominent basal lamella of mandible absent. Apical (masticatory) margin of mandible with >20 denticles, the basal 4–8 of which may be enlarged. Mandibles relatively long, MI>25 (Figs 34–37) .... ***SERRASTRUMA*** (p. 335)

– Differentiated prominent basal lamella of mandible present. Apical (masticatory) margin of mandible with 17 or fewer teeth or denticles of varying size. Mandibles relatively short, MI<25 (Figs 1–15, 17–33) 7

7 Fully closed mandibles with a strongly defined transverse basal border which is separated from the anterior clypeal margin by a conspicuous impression or gap (Fig. 21). Basal lamella of mandible situated ventral to the basalmost tooth, in a plane almost at right-angles to the anterior portion of the mandible, not visible in full-face view with the mandibles open .... ***TRICHOSCAPA*** (p. 319)

– Fully closed mandibles without a strongly defined basal border, the basal region of the mandible contiguous with or overlapped by the anterior clypeal margin, the two not separated by an impression or gap (Figs 1–12, 14, 15, 17–20, 23–29). Basal lamella of mandible following basalmost tooth in the same plane, visible in full-face view with the mandibles open 8

8 With the head in profile the mandibles increasing in width from base to apex and the distal portion of the blades passing into a strong downcurved arc so that part or most of the apical margin is at right-angles to the long axis of the head (Figs 30–33). Masticatory margin of mandible armed with a basal lamella plus 8–11 teeth, the basal 5–8 of which may be very strong (Figs 23–29) .... ***GLAMYROMYRMEX*** (p. 320)

– With the head in profile the mandibles with their upper and lower margins approximately parallel for most of their length or evenly tapering anteriorly. At most the extreme tip of the mandible downcurved, without a major part of the apical margin at right-angles to the long axis of the head (Fig. 13). Masticatory margin of mandible armed with a basal lamella plus 12–17 teeth or denticles, the apicalmost group of which are minute (Figs 1–12, 14, 15, 17–20) .... ***SMITHISTRUMA*** (p. 274)

SMITHISTRUMA Brown

(Figs 1–20)

Cephaloxys F. Smith, 1865: 76. Type-species: *Cephaloxys capitata* F. Smith, 1865: 77, by monotypy. [Junior homonym of *Cephaloxys* Signoret, 1847: 294 (Hemiptera).]

Smithistruma Brown, 1948: 104. Type-species: *Strumigenys pulchella* Emery, 1895*b*: 327, pl. 8, fig. 19, by original designation.

Wessonistruma Brown, 1948: 106 [as subgenus of *Smithistruma*]. Type-species: *Strumigenys pergandei* Emery, 1895*b*: 326, pl. 8, figs 17, 18, by original designation. [Synonymy by Brown, 1973*a*: 35.]

Weberistruma Brown, 1948: 106 [as subgenus of *Smithistruma*]. Type-species: *Strumigenys (Cephaloxys) leptothrix* Wheeler, 1929: 55, fig. 7, by original designation. [Synonymy by Brown, 1973*a*: 35.]

Miccostruma Brown, 1948: 123. Type-species: *Epitritus mandibularis* Szabo, 1909: 1, fig. 2, by original designation. **Syn. n.**

Platystruma Brown, 1953*a*: 112 [as subgenus of *Smithistruma*]. Type-species: *Strumigenys (Cephaloxys) depressiceps* Weber, 1934: 47, fig. 6, by original designation. [Synonymy by Brown, 1973*a*: 35.]

Diagnosis of worker. Afrotropical dacetine ants. Mandibles triangular to narrowly subtriangular and short (MI 7–20), serially dentate or denticulate and lacking an apical fork of spiniform teeth. When fully closed at least the base of the mandible, but sometimes much of its length, concealed by the clypeus; without a sharply defined transverse basal margin which is separated from the anterior clypeal margin by a conspicuous impression or gap. In profile the mandibles with their upper and lower margins approximately parallel for most of their length or evenly tapering anteriorly (Fig. 13), at most with the tip of the mandible downcurved, never with a major part of the apical (masticatory) margin strongly arched-downcurved or at right-angles to the long axis of the head. Apical (masticatory) margin of the mandible with 12–17 teeth following a conspicuously differentiated prominent basal lamella, the lamella concealed by the clypeus when the mandibles are closed. Arrangement of teeth either with 5 larger members, distal to the basal lamella, forming a principal tooth row in which the teeth may be about the same or of different sizes; these followed by two somewhat smaller teeth and a series of 4 minute denticles before the apical tooth or denticle; or with a principal row of 7 teeth followed by 4 minute denticles and an apical tooth or denticle; or with a principal row of 7–8 teeth separated from the basal lamella by a long diastema, the distal member of this series by far the largest tooth on the mandible and followed sequentially by 3 small teeth, a slightly larger tooth, 4 denticles and an apical tooth.

Species of *Smithistruma* have been described from all the zoogeographical regions except the Australian and Malagasy. Undescribed species from the latter region are represented in the BMNH and MCZ, Cambridge collections, but the genus is represented in the Australian region only by the introduced *S. dubia* Brown (R. W. Taylor, pers. comm.). On a worldwide basis 97 *Smithistruma* species have been described, of which 35 are Afrotropical. As indicated in the table of dacetine species presented in the introduction to this paper (p. 270), all other zoogeographical regions now fall behind the Afrotropical in terms of number of *Smithistruma* species, but this picture is somewhat distorted as many new species from other regions await description in the museums of the world.

The modern taxonomic study of *Smithistruma* dates back only to 1953 when Brown (1953*a*) published a world revision of the genus as it was then understood, having previously defined the genus and a number of subgenera in an earlier introductory paper (Brown, 1948). Later Brown (1964) produced a supplement to the world revision and subsequently indicated (Brown, 1973*a*) that the subgenera should be regarded as synonyms of *Smithistruma*, except for *Serrastruma* which he had previously raised to generic status (Brown, 1949*a*). The collapse of the subgenera was due solely to the continuing discovery of species linking groups which originally seemed quite distinct, and this process is still in operation as species reducing or bridging the gaps between many of the genera of short-mandibulate dacetines continue to be found. Indeed, the position of *Smithistruma* itself is not assured. It stands central to, and is the largest single member of, a group of closely related mostly small genera of dacetines with short mandibles which also includes *Pentastruma, Trichoscapa, Tingimyrmex, Kyidris, Chelystruma, Codiomyrmex, Codioxenus, Dysedrognathus, Glamyromyrmex* and *Gymnomyrmex*. Closely linked to these are a number of forms with more specialized and usually longer mandibles which appear to be derived from various members of the *Smithistruma*-group, namely *Asketogenys, Serrastruma, Cladarogenys, Dorisidris* and *Epitritus*. In recent years Brown (1973*a*) and Brown &

Boisvert (1978) have discussed a number of these names and generally concluded that *Serrastruma, Tingimyrmex, Epitritus* and *Kyidris* are valid genera, but that the remainder are dubious and in a state of flux as modern collecting techniques continue to reveal previously unknown species which are gradually filling the gaps originally invoked to separate the genera.

In the present paper a single generic name, *Miccostruma*, is newly synonymized with *Smithistruma*. *Miccostruma* was originally erected by Brown (1948) to include two Afrotropical species, *mandibularis* and *marginata*, which had both been regarded previously as members of *Epitritus*; later Brown (1973*a*) added a third species, *tigrilla*. The characters which Brown used to separate *Miccostruma* from *Smithistruma* were the possession of 4-segmented antennae and relatively very short mandibles by the former, as opposed to 6-segmented antennae and longer mandibles in the latter. With the description of *S. cavinasis* by Brown (1950*b*) it became apparent that species with 6-segmented antennae could also have very short mandibles, as Brown (1953*a*) mentioned in his world revision. This discovery seriously eroded the strength of the character and the present survey has indicated that it has no value at genus level as short mandibles (MI 10 or less) are by no means confined to species with 4-segmented antennae but occur in a wide range of forms from several species-groups.

Concerning the reduced antennal segmentation Brown (1973*a*) has already pointed out that it is a weak character as the fusion of segments which takes place to reduce the antennomere count is not always complete. In *tigrilla*, with correct lighting, the limits of the former segments 3–5, which fuse to form segment 3 in *tigrilla*, can be seen. At present seven Afrotropical species with 4-merous antennae are known. An analysis of their characters indicates that the reduction in antennal segmentation from 6 to 4 has occurred in three separate lines derived from different groups within *Smithistruma*. Of these species with 4-merous antennae *fulda, mandibularis, ninda* and *tigrilla* form a single group which is very closely related to, and most probably directly descended from, the *emarginata*-group. In these four species the clypeus is broad and prominent anteriorly and laterally, is fringed by a continuous row of large specialized hairs and has the anterior margin concave; the mandibles have a high truncated-triangular basal lamella and a principal tooth row of 5. Body pilosity is extremely sparse or absent and flagellate hairs are lacking, but the leading edges of the scapes have projecting strong specialized hairs. The pronotum lacks both lateral margination and a median dorsal longitudinal carina.

Compared to these fundamental shared characters of *mandibularis* and its allies the other three species with 4-merous antennae are very different. In *marginata* the clypeus lacks hairs of any description, has the anterior margin broadly convex and the sides parallel. The mandibles have the basal lamella shaped as a long low lobe and have a principal tooth row of 7. Body pilosity is present and long flagellate hairs occur on the head and alitrunk, but the leading edges of the scapes lack projecting hairs. The pronotum is sharply marginate laterally and has a strong median carina. *S. tacta* and *vodensa* share most of the characters of *marginata* but have the clypeus differently constructed. In *tacta*-group the clypeus is narrow, has convergent sides with a produced and narrowly rounded anterior margin, and is densely clothed with fine hairs. *S. marginata* and *tacta* share more characters between them than either one does with *mandibularis* and its allies, but the fundamental difference in clypeal form indicates that they have arisen from separate origins within *Smithistruma*.

The disparity of these species-group level characters, between *mandibularis* and its allies on the one hand and *marginata* on the other, shows that *Miccostruma* contained, from its inception, elements from fundamentally different origins within *Smithistruma*. The discovery of *tacta* and *vodensa*, from yet another group, makes it clear that reduction in antennomere count has little or no value at genus level amongst the short-mandibulate dacetines. The removal of *marginata* from *Miccostruma* does leave a uniform group of species centring on *mandibularis*, but the overwhelming similarity of these species to the members of the *emarginata*-group, and the collapse of the original separating characters of *Miccostruma*, confirms that the species can no longer be regarded as constituting a separate genus.

All known Afrotropical species of *Smithistruma* inhabit the leaf litter and topsoil layers, usually nesting directly into the ground or in rotten wood. No species is remarkably common and collections of many species are only of a few individual workers. In recent years increased

collecting by funnelling techniques has shown that *Smithistruma* is by no means as poorly represented in Africa as was thought only a few years ago, and many more species probably await discovery; but as Brown (1952*a*, 1953*a*) has pointed out, *Smithistruma* in Africa is more or less eclipsed by the much more common, widely distributed and versatile species of *Serrastruma* which, though having fewer species, greatly outnumber *Smithistruma* in terms of numbers of individuals.

List of Afrotropical *Smithistruma*

mandibularis-group
- ***fulda*** **sp. n.**
- ***mandibularis*** (Szabo) **comb. n.**
- ***ninda*** **sp. n.**
- ***tigrilla*** (Brown) **comb. n.**

emarginata-group
- ***behasyla*** **sp. n.**
- ***cavinasis*** Brown
- ***chyatha*** **sp. n.**
- ***datissa*** **sp. n.**
- ***dendexa*** **sp. n.**
- ***emarginata*** (Mayr)
- ***gatuda*** **sp. n.**
- ***hensekta*** **sp. n.**
- ***impidora*** **sp. n.**
- ***sharra*** **sp. n.**
- ***truncatidens*** Brown

transversa-group
- ***transversa*** (Santschi)

terroni-group
- ***terroni*** **sp. n.**

weberi-group
- ***arahana*** **sp. n.**
- ***enkara*** **sp. n.**
- ***fenkara*** **sp. n.**
- ***kerasma*** **sp. n.**
- ***malaplax*** **sp. n.**
- ***mekaha*** **sp. n.**
- ***minkara*** **sp. n.**
- ***nykara*** **sp. n.**
- ***placora*** **sp. n.**
- ***synkara*** **sp. n.**
- ***tolomyla*** **sp. n.**
- ***weberi*** Brown

marginata-group
- ***marginata*** (Santschi) **comb. n.**
- ***rusta*** **sp. n.**

oxysma-group
- ***anarta*** **sp. n.**
- ***oxysma*** **sp. n.**

tacta-group
- ***tacta*** **sp. n.**
- ***vodensa*** **sp. n.**

Key to species (workers)

1 Antennae with 4 segments 2
– Antennae with 6 segments 8
2 Anterior clypeal margin convex in full-face view (Fig. 20). Pronotum with a median longitudinal carina and pronotal humeri each with a single flagellate hair 3
– Anterior clypeal margin concave in full-face view (Figs 1, 2). Pronotum without a median longitudinal carina and pronotal humeri without flagellate hairs 5
3 Clypeus broad, in full-face view expanded laterally far beyond the line of the outer margins of the closed mandibles (shaped as in Fig. 17). Dorsum of clypeus without hairs. (Ivory Coast, Kenya, Zimbabwe) .... ***marginata*** (p. 312)
– Clypeus narrow, in full-face view more or less continuing the line of the outer margins of the closed mandibles (Fig. 20). Dorsum of clypeus with abundant short curved hairs 4
4 Pronotum sharply marginate laterally, the dorsum unsculptured. Head relatively broad and scapes short, CI>60, SI<75. (Ivory Coast, Ghana, Cameroun, Zaire) .... ***tacta*** (p. 317)
– Pronotum not marginate laterally, the dorsum weakly sculptured. Head relatively narrow and scapes long, CI<60, SI>100. (Cameroun) .... ***vodensa*** (p. 317)
5 Entire body coloured with broad alternating yellow and black transverse bands. Basigastral costulae arising in a continuous row across the tergite, without a central gap. (Ivory Coast, Cameroun) .... ***tigrilla*** (p. 284)
– Body uniformly coloured, without alternating yellow and black broad transverse bands. Basigastral costulae radiating from each side of a central gap 6
6 With the head in profile the dorsum with a pair of short erect hairs close to the occipital margin. (Kenya, Tanzania, Angola) .... ***mandibularis*** (p. 283)
– With the head in profile the dorsum without erect hairs 7
7 Anterior half of clypeus with a broad longitudinal impression mid-dorsally which is filled with short scale-like hairs, these hairs directed towards the midline. Subbasal elbows of scapes

extensively developed and strongly angular (Fig. 1). Pronotal dorsum with dense fine longitudinal rugulae or costulae. (Ivory Coast) .... ***fulda*** (p. 282)

– Anterior half of clypeus without an impression mid-dorsally, this area without short scale-like hairs directed towards the midline. Subbasal elbows of scapes weakly developed, evenly rounded and not angled (Fig. 2). Pronotal dorsum smooth or at most with faint superficial shagreening on the glossy surface. (Ivory Coast, Ghana, Nigeria, Chad, Cameroun) ***ninda*** (p. 284)

8 Dorsum of pronotum extremely coarsely sculptured with strong rugae or sulci which are close packed and give a very coarse overall appearance; without broad shining areas between the rugae or sulci 9

– Dorsum of pronotum varying from smooth to densely reticulate-punctate. Feeble striate sculpture or extremely fine superficial rugulae may occur but coarse rugae or sulci are always absent 20

9 Disc of postpetiole densely and strongly longitudinally costulate 10

– Disc of postpetiole smooth and unsculptured or at most uneven and feebly punctate, never longitudinally costulate 12

10 Head exceptionally long and narrow, CI 54–58 (Fig. 14); antennal scapes relatively long, SI 73–78. (Ivory Coast) .... ***minkara*** (p. 306)

– Head shorter and broader, CI >60; antennal scapes relatively short, SI 68–73 11

11 Disc of postpetiole in dorsal view surrounded on all sides by dense spongiform material. Transverse spongiform strips behind petiole and postpetiole broad and complete. Pronotal dorsum coarsely longitudinally rugose. (Ivory Coast, Ghana, Cameroun)......... ***enkara*** (p. 301)

– Disc of postpetiole in dorsal view with spongiform material only developed posteriorly and posterolaterally. Transverse spongiform strips behind petiole and postpetiole interrupted medially. Pronotal dorsum irregularly reticulate-rugose. (Zimbabwe) .... ***nykara*** (p. 307)

12 With the alitrunk in profile the metanotal groove distinctly impressed. (Fig. 16).................... 13

– With the alitrunk in profile the metanotal groove not impressed, the dorsal outline continuous 15

13 Posterior spongiform margin of postpetiole very deeply indented medially, the indentation reaching to the margin of the disc. (Zaire) .... ***weberi*** (p. 311)

– Posterior spongiform margin of postpetiole very shallowly indented medially, the indentation not approaching the margin of the disc, always a thick band of spongiform material remaining between the margin of the disc and the innermost point of the indentation in the spongiform tissue 14

14 Hairs on dorsum of head strongly arched forward so that their apices are in contact or almost in contact with the surface, without hairs which are erect and sharply angled at about their midlengths. (Cameroun).. ***mekaha*** (p. 305)

– Hairs on dorsum of head, especially on posterior half, with the basal half to two-thirds erect, the apical portion of each hair sharply angled forward. (Cameroun).............. ***kerasma*** (p. 303)

15 Dorsum of head behind clypeus only with fine soft flexuous looped or arched simple hairs, without specialized strong hairs which are similar to those on the clypeal dorsum. (Nigeria, Zaire, Angola) .... ***malaplax*** (p. 304)

– Dorsum of head behind clypeus usually with some fine hairs but also with long stout very conspicuous hairs which are erect and curved anteriorly and which are similar to those on the clypeal dorsum 16

16 With the head in profile the longest hairs arising from the clypeal dorsum (the posteriormost row) at most only half the length of the longest hairs on the cephalic dorsum, which arise just behind the level of the eyes. (Cameroun) .... ***placora*** (p. 308)

– With the head in profile the longest hairs arising from the clypeal dorsum about the same length as those situated on the cephalic dorsum just behind the level of the eyes, or only fractionally different.. 17

17 Posterior spongiform strip of petiole enormously developed, in dorsal view the thickness of the strip from front to back greater than the exposed length of the petiole node; in appearance the strip obviously densely spongiform rather than lamellar. (Cameroun) .... ***arahana*** (p. 300)

– Posterior spongiform strip of petiole narrow and lamellar, in dorsal view the thickness of the strip from front to back conspicuously less than the exposed length of the petiole node 18

18 With the head in posterior view the long hairs arising from the dorsum and sides distinctly swollen apically, increasing markedly in width from base to apex. (Angola)...... ***fenkara*** (p. 302)

– With the head in posterior view the long hairs arising from the dorsum and sides of uniform width throughout their length, not increasing in width from base to apex 19

19 Median indentation in posterior margin of the spongiform strip bordering the postpetiole posteriorly not reaching the sclerotized portion of the disc. Larger species, HW 0·50. (Gabon) .... **synkara** (p. 309)

– Median indentation in posterior margin of the spongiform strip bordering the postpetiole posteriorly reaching to the sclerotized portion of the disc. Smaller species, HW <0·40. (Cameroun) .... **tolomyla** (p. 310)

20 Pronotal humeri each with a single long flagellate hair, the pronotal dorsum with a median longitudinal ridge or carina, at least anteriorly. Leading edges of scapes lacking anteriorly projecting strong hairs, those present being short and appressed. Anterior margin of clypeus convex in full-face view and the lateral clypeal margins lacking a continuous fringe of anteriorly curved spatulate or spoon-shaped hairs (Figs 17–19) 21

– Pronotal humeri without flagellate hairs, the pronotal dorsum without a median longitudinal ridge or carina. Leading edges of scapes with a row of anteriorly projecting strong hairs. Anterior margin of clypeus transverse to concave in full-face view and the lateral clypeal margins with a continuous fringe of anteriorly curved spatulate or spoon-shaped hairs (Figs 3–12) 23

21 Clypeal dorsum in profile without hairs. In full-face view the anterior clypeal margin broadly and evenly convex; sides of clypeus approximately parallel, not forming a more or less continuous line with the outer margins of the closed mandibles (Fig. 17). (Zimbabwe) **rusta** (p. 313)

– Clypeal dorsum in profile with posteriorly or posteromedially curved hairs which are weakly clavate apically. In full-face view the anterior clypeal margin narrowly convex; sides of clypeus converging anteriorly and forming a more or less continuous line with the outer margins of the closed mandibles (Figs 18, 19) 22

22 Elongate hairs on first gastral tergite restricted to a transverse row of four close to the base. Flagellate hairs absent from upper scrobe margins (Fig. 18). (South Africa) .... **anarta** (p. 314)

– Elongate hairs on first gastral tergite numbering 12 or more, not restricted to area close to the base. Two or three flagellate hairs present on each upper scrobe margin (Fig. 19). (South Africa, Lesotho) .... **oxysma** (p. 315)

23 Mandibles with 12 teeth of which one of the basal row of five is the largest. From the base to the apex the mandible with five relatively large teeth followed by two slightly smaller teeth, four minute denticles and a small apical tooth. Diastema between basal lamella and basalmost tooth minute or absent, always smaller than the height of the basalmost tooth (Figs 3–6, 8–12) 24

– Mandibles with 16–17 teeth of which the seventh or eighth from the base is by far the largest. From the base to the apex the mandible with six or seven small teeth followed by a relatively very large tooth, three small teeth, a single slightly larger tooth, four minute denticles and an apical tooth. Diastema between basal lamella and basalmost tooth long, distinctly much longer than the height of the basalmost tooth (Fig. 7). (Cameroun) .... **terroni** (p. 299)

24 With the head in full-face view the entire dorsum with large flattened very broadly scale-like to suborbicular hairs (Fig. 3) 25

– With the head in full-face view the dorsum without large flattened broadly scale-like to suborbicular hairs or at most with such hairs occurring in one or two sharply defined transverse bands 26

25 Postpetiole and first gastral tergite with erect hairs present. CI 63–67. Scale-like hairs inconspicuous or absent on disc of postpetiole. (Cameroun, Zaire, Angola) .... **cavinasis** (p. 287)

– Postpetiole and first gastral tergite without erect hairs. CI 56–63. Scale-like hairs sparse but obvious on disc of postpetiole. (Ivory Coast, Ghana, Cameroun, Angola) .... **sharra** (p. 295)

26 First gastral tergite without standing hairs 27

– First gastral tergite with standing hairs which are usually numerous but which may be restricted to a single basal pair and a single apical pair 28

27 Dorsum of head with a transverse band of broadly scale-like to suborbicular hairs just in front of the occipital margin (Fig. 5). (Ghana) .... **chyatha** (p. 288)

– Dorsum of head lacking hairs of any description except for the fringe around the clypeal margins (Fig. 6). (Ivory Coast) .... **impidora** (p. 294)

28 Base of first gastral tergite sharply impressed medially, the sclerite with a dented appearance. Scapes relatively long, SI 72–80 (Fig. 8). (Ivory Coast, Ghana, Togo, Burundi, Zimbabwe, Angola, South Africa) .... **emarginata** (p. 291)

– Base of first gastral tergite not impressed medially. Scapes shorter, SI 58–67 (Figs 4, 9–12) 29

29 Pronotal disc glassy smooth between very widely scattered small punctures. (Rwanda) ..... ***gatuda*** (p. 292)
– Pronotal disc uniformly closely sculptured, subopaque to opaque 30
30 Dorsum of head in full-face view with a transverse band of broadly scale-like hairs in front of the occipital margin and another just behind the level of the frontal lobes (Fig. 4). (Cameroun) ..... ***behasyla*** (p. 286)
– Dorsum of head in full-face view without two bands of broadly scale-like hairs as described above 31
31 With the head in full-face view the lateral margins behind the level of the eyes with conspicuous freely projecting hairs (Figs 10, 12) 32
– With the head in full-face view the lateral margins behind the level of the eyes without freely projecting hairs or at most with a single short hair at the scrobal apex; any other hairs present are strongly curved anteriorly and closely applied to the surface, not freely projecting (Fig. 9) 34
32 Anterior clypeal margin transverse (Fig. 12). Dorsal alitrunk with six or seven pairs of erect hairs. Base of first gastral tergite with a broad transverse spongiform strip, the basigastral costulae commencing behind the strip and not impinging upon it. (Ivory Coast, Ghana, Cameroun, Gabon, Angola) ..... ***hensekta*** (p. 293)
– Anterior clypeal margin concave (Fig. 10). Dorsal alitrunk with one or two pairs of erect hairs. Base of first gastral tergite with a transverse lamellate strip, the basigastral costulae running across the strip to the basal margin 33
33 Pronotal dorsum punctate. Slightly larger species, HW 0·46–0·54. (Rwanda, Burundi, Kenya, Tanzania) ..... ***truncatidens*** (p. 296)
– Pronotal dorsum finely longitudinally rugulose. Slightly smaller species, HW 0·40. (Cameroun) ..... ***dendexa*** (p. 290)
34 Dorsum of postpetiole finely longitudinally costulate. Infradental lamella of propodeum reduced to a mere carina on each side. Larger and with broader head, HW 0·54, CI 77 (Fig. 9). (Rwanda) ..... ***datissa*** (p. 289)
– Dorsum of postpetiole unsculptured and smooth. Infradental lamella of propodeum broad and conspicuous. Smaller and with narrower head, HW 0·42–0·46, CI 68–71. (South Africa) ..... ***transversa*** (p. 297)

The species-groups

The 35 known Afrotropical species of *Smithistruma* are divided into eight species-groups; with four species in the *mandibularis*-group, 11 in the *emarginata*-group, 12 in the *weberi*-group, two each in the *marginata*-, *oxysma*-, and *tacta*-groups, and one each in the *transversa*- and *terroni*-groups.

The *mandibularis*-group (Figs 1, 2) and *emarginata*-group (Figs 3–6, 8–13) are very closely related, the former apparently being directly derived from the latter by reduction of the antennal segmentation from 6 to 4 and by shortening of the antennal scapes. Most of the characters of these two groups (see diagnoses) are also shared by the *transversa*-group but in this last-named group the basal lamella of the mandible is different in shape and more extensive than in either of the foregoing groups. In *transversa* the basal lamella of the mandible is a broadly rounded lobe which is visible even when the mandibles are completely closed, whereas in both the *mandibularis*- and *emarginata*-groups the lamella is a truncated high triangle or high rectangle which is concealed by the clypeus when the mandibles are fully closed. Brown (1953*a*: 125) included *transversa* in the *emarginata*-group but I consider that the difference in structure of the basal lamella of the mandible is sufficient to exclude it. Reinforcing this decision is the presence of a broad infradental lamella on the propodeum in *transversa*, a character not developed in the *emarginata*-group (but present in the *mandibularis*-group).

On a broader basis the *emarginata*-group may be cognate with the Holarctic *rostrata*-group of Brown (1953*a*: 81), or with part of it. Until a fuller investigation of the *rostrata*-group species from the U.S.A., China and Japan can be made it seems most advisable to keep the groups separate, especially as *rostrata* (Emery) itself has a long stout simple hair at each of the pronotal humeri, a character not encountered in any species of the *emarginata*-group as defined in this paper.

The *terroni*-group, with its single species (Fig. 7), has been derived directly from the

emarginata-group by modification of the mandibular structure. In *terroni* the mandibular blades have narrowed and lengthened, opening a long diastema between the basal lamella and the basalmost tooth, and the number of teeth present has been increased from 12 to 16–17. Apart from these developments the remaining diagnostic characters conform with those of the *emarginata*-group.

The *weberi*-group constitutes a peculiarly Afrotropical assemblage of striking species which are immediately recognized by their very coarse heavy sculpture and fine dense simple pilosity (Figs 14–16). In mandibular structure they resemble the members of the *emarginata*-group, having a high truncated basal lamella followed by a row of five principal teeth, two slightly smaller teeth, four minute denticles and a small apical tooth. However, here the similarity ends and the members of the *weberi*-group are not obviously closely related to any other group, either in Africa or elsewhere.

The *oxysma*-group (Figs 18, 19), containing two species, has a characteristic clypeal form and pilosity. The sides of the clypeus are convergent anteriorly and the anterior margin is prominent and narrowly rounded so that the outer margins of the mandibles and the clypeus form a more or less continuous line in full-face view. The clypeal dorsum is equipped with feebly clavate hairs which characteristically curve posteriorly or posteromedially. This form of clypeus approximates closely to the Nearctic/Neotropical *ornata*-group (Brown, 1953*a*: 64), but in the three known species of this group (*ornata* (Mayr), *dietrichi* (M. R. Smith), *hyphata* Brown) the mandibles have a long diastema between the basal lamella and the first tooth of the principal row. In the Afrotropical species *oxysma* and *anarta* no such diastema is developed.

The *marginata*-group contains only the two species *marginata* and *rusta* (Fig. 17). The first of these was included as a member of the now synonymized genus *Miccostruma* because of its 4-merous antennae and relatively short mandibles. It is now apparent that the the reduction of antennal segmentation from 6 to 4 has occurred independently three times among Afrotropical *Smithistruma* (in the *tacta*-group, the *mandibularis*-group, and in *marginata*), in species that are otherwise broadly dissimilar, and as a result its value as a genus-level character has disappeared (see the discussion of the genus, above). The shape of the clypeus in *marginata* is characteristic and is not matched by members of the *mandibularis*- or the *tacta*-group. Only one other species, *rusta*, has a clypeus shaped like that of *marginata* and so I have grouped them together here. In both species the lateral margins of the clypeus are more or less straight and parallel and the anterior margin is broadly and shallowly convex; the clypeus is devoid of hairs both dorsally and on its margins. For further characters in which the two species coincide, and those in which they differ, see the diagnosis of the *marginata*-group.

Finally the *tacta*-group (Fig. 20), another group having only 4 antennal segments, must be considered. In clypeal form, structure of the mandibular teeth, presence of long flagellate hairs on the pronotal humeri, lack of projecting hairs on the leading edges of the scapes, presence of a median pronotal carina and presence of propodeal infradental lamellae, *tacta*-group members resemble the *oxysma*-group. However, the reduced antennal segmentation and presence of dense simple clypeal pilosity without specialized hairs argue against its inclusion with *oxysma* and for the present it is left on its own.

Key to species-groups (workers)

1 Leading edges of antennal scapes without a series of freely anteriorly projecting strong erect to suberect hairs (Figs 17–20). Pronotal humeri with a long flagellate hair on each side. Pronotal dorsum with a median longitudinal ridge or carina at least anteriorly 2

– Leading edges of antennal scapes with a series of freely anteriorly projecting strong erect to suberect hairs which may be simple or bizarre (Figs 1–12, 14, 15). Pronotal humeri without flagellate hairs. Pronotal dorsum without a median longitudinal ridge or carina.................... 4

2 Clypeus without hairs; in full-face view the clypeal margins lacking fringing pilosity, in profile the clypeal dorsum without hairs. Anterior clypeal margin broadly and shallowly convex in full-face view, the sides more or less parallel and not converging anteriorly (Fig. 17)
marginata-group (p. 311)

– Clypeus with hairs; in full-face view the clypeal margins with fringing pilosity or at least with a

few hairs projecting; in profile the clypeal dorsum with hairs present. Anterior clypeal margin narrowly rounded in full-face view, the sides more or less evenly convergent anteriorly (Figs 18–20) 3

3 Antennae with 6 segments. Clypeus with specialized long recurved hairs present (Figs 18, 19) ***oxysma***-group (p. 314)

– Antennae with 4 segments. Clypeus without specialized long recurved hairs (Fig. 20) ***tacta***-group (p. 316)

4 Pronotal dorsum extremely coarsely sculptured with rugae or sulci. With the clypeus in full-face view the fringing pilosity not consisting of a regular row of curved broad spatulate to spoon-shaped hairs but rather of irregular long cylindrical simple hairs which may or may not be curved (Figs 14, 15) .... ***weberi***-group (p. 300)

– Pronotal dorsum finely sculptured to smooth, never with coarse rugae or sulci. With the clypeus in full-face view the fringing pilosity consisting of a regular row of curved broad spatulate to spoon-shaped hairs (Figs 1–12) 5

5 Mandibles with a long diastema between the basal lamella and the basalmost tooth, the diastema much longer than the height of the basalmost tooth. 16–17 teeth present, the seventh or eighth tooth from the base by far the largest (Fig. 7) .... ***terroni***-group (p. 298)

– Mandibles without a diastema or at most with a minute diastema between the basal lamella and the basalmost tooth; when present the length of the diastema distinctly much shorter than the height of the basalmost tooth. 12 teeth present, one of the basal series of 5 the largest (Figs 1–6, 8–12) 6

6 Basal lamella of mandible an evenly rounded broad lobe which is visible even when the mandibles are fully closed. Anterior clypeal margin transverse .... ***transversa***-group (p. 297)

– Basal lamella of mandible either a high triangle which may be truncated apically, or a high rectangle which may have concave sides; the lamella concealed by the clypeus when the mandibles are closed. Anterior clypeal margin usually concave, only rarely transverse 7

7 Antennae with 4 segments. Scapes relatively short, SI 50–57. Propodeum with a conspicuous infradental lamella .... ***mandibularis***-group (p. 281)

– Antennae with 6 segments. Scapes longer, SI 58–80. Propodeum without or with only a slender infradental lamella .... ***emarginata***-group (p. 285)

The *mandibularis*-group

(Figs 1, 2)

Antennae with 4 segments. Basal lamella of mandible a high narrow triangle, usually truncated apically; tooth row of mandible without or with a minute diastema, the principal tooth row of 5. Sculpture of head and body fine, without coarse rugae or sulci on the pronotum. Anterior clypeal margin always concave in full-face view. Lateral and anterior margins of clypeus fringed by a continuous row of projecting flattened or spoon-shaped large hairs which are smaller on the anterior than on the lateral margins. These hairs are curved anteriorly on the sides of the clypeus, medially on the anterolateral angles, and are directed anteriorly or are curved slightly towards the midline on the anterior margin. Body hairs very sparse to absent. Flagellate hairs absent. Leading edges of scapes with strong anteriorly projecting hairs. Dorsal (outer) surfaces of middle and hind tibiae without projecting hairs. Pronotum not marginate laterally and without a median longitudinal ridge or carina on the dorsum. Propodeal spines or teeth subtended by a broad infradental lamella. Postpetiole in dorsal view with spongiform appendages restricted to a posterior transverse strip which is broadest at the posterolateral angles; the disc not completely surrounded by spongiform tissue.

The four closely related species presently recognized in this group appear to be descended directly from the *emarginata*-group and share most characters with that group. They differ primarily by their reduced antennal segmentation, short antennal scapes, development of a broad infradental lamella on the propodeum and by their drastic reduction of body pilosity, although this last character is paralleled by the *chyatha*-complex of the *emarginata*-group. For the separation of the *mandibularis*-group from the remaining species-groups of Africa see the key to groups above and the diagnoses of the individual groups.

As discussed under the diagnosis of the genus the two previously described members of this group (*mandibularis* and *tigrilla*) constituted two-thirds of the now abandoned genus *Miccostruma*. For the third species formerly placed in *Miccostruma* see under the *marginata*-group, below.

Three of the four species in the group occur in West and Central Africa where they constitute a part of the leaf litter and topsoil fauna. *S. tigrilla*, with its distinctive black and yellow transverse bands and continuous row of basigastral costulae, is known from Ivory Coast and Cameroun, and most probably also occurs in the territories between these countries. The other two species occurring in the same area as *tigrilla, ninda* and *fulda* are uniformly coloured and have the basigastral costulae originating on each side of a central gap or clear area. *S. fulda* has only been recorded from Ivory Coast, but *ninda* is much more widely distributed, material having been seen from Ivory Coast, Ghana, Nigeria, Chad and Cameroun. The only representative of the *mandibularis*-group known from East and southern Africa is *mandibularis* itself, recorded to the present from Kenya, Tanzania and Angola. Like *fulda* and *ninda* it has basigastral costulae which radiate from each side of a central gap, but unlike them it possesses a pair of standing hairs on the cephalic dorsum close to the occipital margin. A fifth, as yet undescribed, species belonging to this group occurs in the Malagasy region.

Smithistruma fulda sp. n.

(Fig. 1)

Holotype worker. TL 2·0, HL 0·53, HW 0·42, CI 79, ML 0·04, MI 8, SL 0·24, SI 57, PW 0·26, AL 0·54.

Basal lamella of mandible concealed by clypeus, dentition as described for *mandibularis*. Anterior clypeal margin very deeply concave medially, the inner margin of the concavity with 5 pairs of scale-like (inner 3 pairs) to spoon-shaped (outer 2 pairs) hairs which project inward over the mandibles. Anterolateral clypeal angles broadly convex on each side of the median impression, equipped with a series of medially curved spatulate to spoon-shaped hairs which continue along the lateral clypeal margins to about the midlength of the sides of the clypeus. Dorsum of clypeus with the area behind the marginal concavity transversely quite deeply depressed, this concave area occupying about the central third of the dorsum and just over half its total length, from the anterior margin to about the level of the frontal lobes. Areas of the clypeus on each side of this central concave area are convex, as is the posterior portion of the clypeus between the frontal lobes. Dorsum of clypeus densely clothed with small flattened to scale-like hairs which are closely applied to the surface and are directed towards the clypeal midline except on that portion of the clypeus between the frontal lobes where they are directed anteriorly. Cephalic dorsum with numerous short spatulate to scale-like hairs which are larger than those on the clypeus and are all closely applied and directed forward. Dorsum of head without projecting hairs of any description. Antennae with 4 segments. The scape narrow at the extreme base but then suddenly and very powerfully expanded, flattened and extremely broad, the leading edge passing through a strongly anteriorly projecting right-angle and equipped with a series of strong projecting hairs, the longest of which is situated at the apex of the projection. Eyes small, maximum diameter about 0·10×HW, markedly smaller than the maximum diameter of the scape. Dorsum of head reticulate-punctate, the clypeal dorsum finely granular but the sculpture partially concealed by the pilosity. Pronotum not marginate laterally, the dorsum without a median longitudinal ridge or carina but the anterior pronotal border weakly marginate. In profile the dorsal alitrunk consisting of three separate very shallow convexities, the mesonotal slightly higher than the pronotal or propodeal, but the propodeal anteriorly the most strongly convex. Metanotal groove absent but the dorsum with a very slight indentation where the mesonotal convexity meets the propodeal. Propodeal spines not elevated but upcurved along their length, the basal halves of their ventral margins confluent with the broad infradental lamellae. Alitrunk in dorsal view with the metanotal groove represented by a transverse line and change in sculpture. Dorsal surfaces of alitrunk and petiole without standing hairs of any description but the postpetiole with a single pair of simple hairs which are directed posteriorly. First gastral tergite near base with a pair of very stout appressed hairs which are weakly clavate apically. It is possible that these hairs should be erect but have been flattened down as an accident of preservation. Gastral segments behind the first with sparse hairs. Dorsal alitrunk with scattered minute appressed spatulate hairs. Dorsal surfaces of petiole, postpetiole and first gastral tergite with similar or even smaller appressed pubescence. Pronotal dorsum finely longitudinally costulate to rugulose. Mesonotum finely rugulose anteriorly and punctulate posteriorly, the two forms of sculpture blending together centrally. Propodeal dorsum unsculptured except for some fine punctures laterally; declivity unsculptured. Dorsum of petiole node with the faintest vestiges of punctulate sculpture, the postpetiole unsculptured. First gastral tergite unsculptured except for the basal costulae which radiate from the anterolateral margin on each side of a median area which is clear. Spongiform appendages of pedicel segments well developed in profile. In dorsal view the petiole node bordered posteriorly by a broad transverse spongiform strip, the concave anterior face of the postpetiolar disc bordered by a vestigial lamina. Ventrolateral spongiform

tissue of postpetiole does not project beyond the lateral margins of the disc in dorsal view. Convex posterior margin of postpetiole with an appendage which is broad and spongiform posterolaterally but narrowed and laminar medially where the posterior margin of the disc itself is flattened. Base of first gastral tergite with a lamellar transverse margin which is smooth medially but traversed by the strong basigastral costulae on each side. Colour dark brown to blackish brown, the clypeus and appendages lighter.

Holotype worker, **Ivory Coast**: Issoneu, 12.x.1980 (*V. Mahnert & J.-L. Perret*) (MHN).

In the *mandibularis*-group *fulda* is immediately recognized by the massive angular extension of the antennal scape, the form and pilosity of the clypeus and the costulate-rugulose pronotal sculpture. Beside this *fulda* lacks the conspicuous yellow and black bands of *tigrilla* and does not have the pair of erect hairs on the vertex characteristic of *mandibularis*.

Smithistruma mandibularis (Szabo) **comb. n.**

Epitritus mandibularis Szabo, 1909: 1, fig. 2. Syntype workers, TANZANIA: Mto-ya-kifaru (*K. Katona*) (TM) [examined].
Miccostruma mandibularis (Szabo) Brown, 1948: 123.

WORKER. TL 1·7–1·8, HL 0·46–0·52, HW 0·35–0·41, CI 75–80, ML 0·04–0·06, MI 8–11, SL 0·18–0·21, SI 50–57, PW 0·20–0·23, AL 0·44–0·48 (10 measured).

Mandibles armed with a high narrow-based triangular basal lamella which is truncated apically and concealed by the clypeus when the mandibles are closed. Basal lamella without or with only a minute diastema between itself and the principal row of five relatively large teeth, the lamella slightly longer than the largest of these teeth. Distally the principal tooth row followed by two slightly smaller teeth, a series of four minute denticles and a small apical tooth. Anterior clypeal margin concave, the concavity here shallower than in other members of the group, the margin equipped with 3–4 pairs of scale-like hairs which project over the mandibles. Lateral margins of clypeus convergent anteriorly and equipped with a freely projecting fringe of large anteriorly curved spatulate to spoon-shaped hairs. Dorsum of clypeus and cephalic dorsum in full-face view with scattered minute appressed flattened hairs which are directed anteriorly. In profile the dorsal surface with a single pair of erect feebly clavate hairs which are weakly curved forward and are situated just behind the highest point of the vertex. Antennae with 4 segments. Scape narrow basally, bent at about the basal quarter and the anterior border expanded at about this level. Leading edges of scapes flattened and rounded, expanded but not projecting as a strong lobate or angular prominence, equipped with a projecting row of spatulate to spoon-shaped strong hairs. Maximum diameter of eye 0·11×HW. Dorsum of head finely and densely reticulate-punctate to punctate-granular, the sculpture weaker or effaced on the clypeus. Anterior border of pronotum weakly marginate. Sides of pronotum not marginate, the dorsum without a median longitudinal ridge or carina. With the alitrunk in profile the metanotal groove faintly marked, the propodeal teeth with a broad and very conspicuous infradental lamella. All dorsal surfaces of body with scattered minute appressed pubescence. Alitrunk without standing hairs but a pair present on the posterior margin of the petiole node, a second pair on the posterior margin of the postpetiole, a third pair on the base of the first gastral tergite and a fourth pair at the apex of that sclerite. Remaining gastral tergites with sparse erect hairs. Dorsum of pronotum and mesonotum with very faint superficial granular or punctulate sculpture, the propodeal dorsum smooth or with vestigial punctures. Petiole node dorsally with vestigial punctures but disc of postpetiole smooth. First gastral tergite unsculptured except for the basigastral costulae which arise on each side of a median clear area. Spongiform appendages of pedicel segments well developed in profile. In dorsal view the petiole node with a posterior transverse spongiform strip. Anterior margin of postpetiole with a vestigial strip which is less than half the width of that on the petiole. Posterior margin of postpetiole with a transverse strip which is broadest laterally, narrowed medially. Base of first gastral tergite with a lamellar strip which is narrowest medially where its anterior margin is concave, and broadest laterally where its anterior free margin is convex and traversed by the basigastral costulae. Colour yellow to light brownish yellow.

To the present this is the only species of the group to be found in eastern and southern Africa. The other three species are more or less restricted to the rain forest zones of West and Central Africa.

MATERIAL EXAMINED

Kenya: Tana R., Wema (*V. Mahnert & J.-L. Perret*); Kilife dist., Jilore (*V. Mahnert & J.-L. Perret*); Lamu, nr Witu (*V. Mahnert & J.-L. Perret*); Kisumu, Chemelil (*V. Mahnert*). **Angola**: Salazar (*P. Hammond*). **Tanzania**: Mto-ya-kifaru (*K. Katona*).

Smithistruma ninda sp. n.

(Fig. 2)

Holotype worker. TL 1·8, HL 0·52, HW 0·38, CI 73, ML 0·04, MI 8, SL 0·20, SI 53, PW 0·24, AL 0·48.

Anterior clypeal margin deeply concave medially, the concavity fringed with 4 pairs of scale-like hairs which project over the mandibles. Sides of clypeus distinctly convergent anteriorly, fringed by a continuous row of spatulate to spoon-shaped hairs which are curved anteriorly. Mandibles closed in holotype but from a paratype the dentition consisting of a high narrowly triangular basal lamella which is blunted apically and distinctly longer than the largest tooth. A minute diastema separates the basal lamella from the principal row of 5 relatively stout teeth, and these are followed distally by two slightly smaller teeth, 4 minute denticles and a small apical tooth. Dorsum of clypeus and cephalic dorsum without standing hairs of any description, with widely scattered and somewhat flattened minute appressed hairs which are directed anteriorly. Antennae with 4 segments. Scape narrow at base, bent and suddenly broadened in its basal quarter; the leading edge broadly convex at the bend and equipped with a row of freely projecting spatulate to spoon-shaped hairs, but the margin not projecting forward into a broad free lobe or strong angle. Maximum diameter of eye 0·13×HW. Dorsum of head finely and densely reticulate-punctate, the sculpture becoming finer and more granular anteriorly. Clypeal dorsum granular to merely shagreened. Pronotum without a median longitudinal ridge or carina dorsally, not marginate laterally, the dorsum shallowly transversely convex and rounding broadly and evenly into the sides. With the alitrunk in profile the mesonotum forming a shallow convexity separate from that of the pronotum and propodeum, the metanotal groove extremely faintly indicated on the dorsum, not impressed in profile. Propodeal teeth short and triangular, the anterior half or slightly more of the ventral margin confluent with the broad infradental lamellae. Dorsal surfaces of alitrunk, petiole and first gastral tergite only with very sparse minute appressed pubescence, without standing hairs of any description. Posterior border of postpetiole with a single pair of feebly clavate standing hairs and similar hairs are present on the gastral tergites behind the first. Sides of alitrunk smooth, with a few feeble marginal punctures. Dorsal alitrunk smooth except for a narrow band of punctures just behind the anterior pronotal margin. The alitrunk frequently with a dull slightly rough appearance due to a superficial waxy deposit which when removed leaves the surface smooth and highly polished. Petiole and postpetiole unsculptured dorsally, the first gastral tergite unsculptured except for the basigastral costulae which arise on each side of a central clear area. Spongiform appendages of pedicel segments moderately developed in profile. In dorsal view the petiole node with a distinct spongiform strip posteriorly. Anterior margin of postpetiole with a strip which is about half the width of that on the petiole. Posterior margin of postpetiole with a spongiform strip which is broadest laterally and narrowed centrally. Base of first gastral tergite with a laminar strip which is broadest laterally where it is traversed by the basigastral costulae. Colour dark brown.

Paratype workers. TL 1·7–1·8, HL 0·48–0·52, HW 0·37–0·38, CI 73–79, ML 0·03–0·05, MI 7–10, SL 0·18–0·20, SI 50–54, PW 0·22–0·24, AL 0·47–0·50 (9 measured).

As holotype, the maximum diameter of the eye 0·12–0·14×HW.

Holotype worker, **Cameroun**: Nkoemvon, 28.ix.1980, no. N 33 (*D. Jackson*) (BMNH).

Paratypes. 6 workers with same data as holotype; 3 workers with same data but 6.x.1980, no. N 34; 1 worker with same data but 1.viii.1980, no. N 18 (BMNH; MCZ; MHN; ENSA).

Non-paratypic material examined. **Ivory Coast**: Gregbeu (*V. Mahnert & J.-L. Perret*); Monogaga (*V. Mahnert & J.-L. Perret*). **Ghana**: Tafo (*D. Leston*); Mampong (*P. M. Room*). **Nigeria**: Gambari (*B. Taylor*); Ibadan (*B. R. Critchley*); Ibadan (*A. Russell-Smith*). **Chad**: Umg. Maundou (*H. Franz*).

The non-paratypic material from Ivory Coast has the alitrunk light brown and the gaster much darker brown, and has a single pair of stout erect hairs close to the base of the first gastral tergite. Such hairs are absent in the type-series but are frequently seen in Ghanaian and Nigerian specimens. The colour of the Ghana material is intermediate between that of the holotype and the ligher Ivory Coast samples.

Smithistruma tigrilla (Brown) comb. n.

Miccostruma tigrilla Brown, 1973*a*: 32, figs 1, 2. Holotype worker, Ivory Coast: nr Divo, 18.iii.1963, berlesate from rain forest leaf litter (*L. Brader*); and paratype worker, Banco Forest Res., nr Abidjan, circuit 1, i.1963, berlesate from rain forest leaf litter (*W. L. Brown*) (MCZ; BMNH) [examined].

Worker. TL 2·0–2·2, HL 0·56–0·62, HW 0·48–0·51, CI 82–88, ML 0·05–0·06, MI 9–11, SL 0·23–0·26, SI 48–52, PW 0·30–0·32, AL 0·55–0·62 (4 measured).

Dentition of mandibles apparently as described under *mandibularis*. Anterior clypeal margin very broadly and deeply arched-concave, the excavation semicircular in full-face view and the concave margin with 5 pairs of projecting scale-like to spatulate small hairs which are curved medially. Sides of clypeus weakly convergent anteriorly, equipped with a fringe of freely projecting large spatulate to spoon-shaped hairs which are curved anteriorly. Because of the width and depth of the clypeal concavity the anterolateral angles seem narrow and strongly prominent anteriorly. Dorsum of clypeus and cephalic dorsum with widely scattered decumbent to appressed anteriorly directed minute flattened hairs which are very inconspicuous; without standing hairs of any description. Antennae with 4 segments. Scape narrow basally but then the leading edge suddenly broadened into a large anteriorly prominent rounded lobe. Leading edges of scape with a row of large freely projecting spatulate to spoon-shaped hairs. Maximum diameter of eye 0·14–16×HW. Cephalic dorsum densely and quite sharply reticulate-punctate, the posterior clypeus similarly but more finely sculptured, the sculpture tending to fade out towards the anterior clypeal margin. Pronotal dorsum more or less flat transversely, the dorsum meeting the sides in a bluntly rounded angle. Pronotum without a median longitudinal ridge or carina. With alitrunk in profile the mesonotum forming a shallow convexity which is separate from the pronotum and propodeum. Metanotal groove extremely feebly marked by an impression, its location more obviously indicated by a change of colour. Propodeal teeth without any portion which is free of the infradental lamella. Dorsal surfaces of alitrunk, petiole, postpetiole and first gastral tergite without standing hairs of any description, only with minute appressed slightly flattened pubescence which is very sparse. Gastral tergites behind the first with weakly clavate hairs. Sides of alitrunk mostly smooth, with marginal punctation. Dorsal surfaces of alitrunk, petiole and postpetiole finely and densely reticulate-punctate to granular, the postpetiole also with fine longitudinal costulae or rugulae at least on the anterior half of the disc. Spongiform appendages of pedicel segments only moderately developed in profile, the ventral appendage of the petiole represented only by a small posteroventral lobe below the node. In dorsal view the petiole node with a narrow posterior strip and the postpetiole with an anterior strip of about the same width or even narrower. Posterior margin of postpetiole with a spongiform strip which is broadest laterally and very narrow or even interrupted medially. Posteromedian area of postpetiole disc impressed. Base of first gastral tergite with a narrow spongiform strip which is concave anteromedially. Basigastral costulae arising right across the base of the first tergite, without a broad central gap. Mandibles, clypeus and antennae yellow; remainder of head black. Pronotum, mesonotum and forelegs yellow; propodeum, pleurae, middle and hind coxae black. Middle and hind femora dusky at least basally, remainder of legs yellow. Petiole and postpetiole black. Basal third of first gastral tergite yellow or yellowish white, the rest of the gaster black.

Rendered very distinctive by its conspicuous black and yellow colour pattern, *tigrilla* is also characterized by its lack of dorsal pilosity, rugulose-costulate postpetiolar dorsum, basigastral costulae which arise in a continuous row without a central clear area, and evenly sculptured dorsal alitrunk.

MATERIAL EXAMINED

Ivory Coast: nr Divo (*L. Brader*). **Cameroun**: Korup Res. (*D. Jackson*).

The *emarginata*-group

(Figs 3–6, 8–13)

Antennae with 6 segments. Basal lamella of mandible a high triangle which is narrowly truncated apically, or a concave-sided high rectangle; never a low rounded lobe; never with a marked diastema. Principal dental row of mandible with 5 teeth. Sculpture of head and body fine, without coarse rugae or sulci on the pronotum. Anterior clypeal margin usually concave in full-face view, rarely transverse and never convex. Lateral and anterior margins of the clypeus fringed by a continuous row of large projecting specialized hairs which are usually flattened, spatulate or spoon-shaped and which are very conspicuous, curving anteriorly on the sides, medially on the anterolateral angles and towards the midline on the anterior clypeal margin. Pilosity of head behind clypeus very variable but never consisting solely of fine simple hairs. Frequently very few hairs are present and sometimes none. Flagellate hairs absent from head and alitrunk. Leading edges of scapes with anteriorly projecting stout or bizarre specialized hairs. Dorsal (outer) margins of middle and hind tibiae lacking projecting hairs, any hairs which do occur here are decumbent to appressed. Pronotum not sharply marginate laterally and without a median longitudinal ridge or carina. Propodeum usually without an infradental lamella but sometimes a very narrow to vestigial lamella present.

Eleven species are currently recognized in this group, falling into three complexes of closely related forms.

The *chyatha*-complex (Figs 3–6), containing *behasyla, cavinasis, chyatha, impidora* and *sharra*, is characterized by the presence of exceptionally fine and dense pronotal sculpture which usually appears as minute close-packed longitudinal striolae or rugulae upon a granular surface. Coupled with this the head is usually granular, erect hairs are absent from the dorsal alitrunk, and in most suborbicular or very broadly scale-like hairs are developed on the head. These hairs are best developed in *cavinasis* and *sharra*, in which the whole head is covered with them; they are present in transverse bands in *chyatha* and *behasyla*. In *impidora* such hairs are absent but it is not known whether this condition is basal for the *chyatha*-complex as a whole or represents a stage where these specialized hairs have been secondarily lost. However, in *chyatha* and *impidora* the head is strongly dorsoventrally flattened, which is certainly a secondary adaptation, and the sequence *sharra–behasyla–chyatha–impidora*, showing increased flattening of the head and gradual disappearance of the specialized hairs, implies that the second alternative is most probably correct.

This complex, all the members of which are restricted to West and Central Africa, appears to be the stock from which the *terroni*-group is descended. Apart from the modified mandibles of *terroni* its overall resemblance to the members of the *chyatha*-complex is striking.

The *truncatidens*-complex (Figs 9–13), containing *datissa, dendexa, gatuda, hensekta* and *truncatidens*, is defined by the predominance of punctate sculpture on the head and alitrunk, presence of erect hairs on the dorsal alitrunk and lack of broadly scale-like or suborbicular hairs. The head in profile is depressed anteriorly but strongly thickened at the vertex. Members of this complex approach the *rostrata*-group, as noted in the discussion of the species-groups, and also seem to represent the stock from which both the *mandibularis*-group and the *transversa*-group developed. This complex tends to be more widely distributed than the above, with a preponderance of species in East Africa.

The *emarginata*-complex (Fig. 8), containing only *emarginata* itself, is defined by its abundant spoon-shaped cephalic pilosity and basigastral costulae that radiate from each side of a median broad indentation on the first tergite. The species is perhaps the most successful member of the genus in Africa, being found to the present in Ivory Coast, Ghana, Togo, Burundi, Zimbabwe, Angola and South Africa.

Smithistruma behasyla sp. n.

(Fig. 4)

Holotype worker. TL 2·5, HL 0·67, HW 0·42, CI 63, ML 0·11, MI 16, SL 0·28, SI 67, PW 0·27, AL 0·68.

Mandibular dentition as described for *cavinasis*. Anterior clypeal margin very shallowly evenly concave, equipped with a row of broad short flattened hairs which project forward over the mandibles. Anterolateral clypeal angles rounded, the sides feebly divergent posteriorly and with a continuous row of anteriorly curved large spatulate to spoon-shaped hairs. In full-face view the preocular laminae feebly convergent posteriorly. Upper scrobe margins divergent posteriorly and with a row of anteriorly directed scale-like to broadly spoon-shaped hairs which are strongly curved. Occipital margin deeply evenly concave. Clypeal dorsum in full-face view with minute appressed stubble-like ground-pilosity, the individual hairs widely scattered. Cephalic dorsum just behind the level of the frontal lobes with a transverse band of broadly scale-like to suborbicular hairs. Behind this band the head only with stubble-like ground-pilosity like that on the clypeus but the zone between the highest point of the vertex and the occipital margin with a second transverse band of broadly scale-like hairs. Dorsum of head without simple fine hairs, without flagellate hairs. Scape bent in the basal third, somewhat flattened and broadest just distal to the bend, the leading edge equipped with a row of freely projecting spatulate to narrowly spoon-shaped hairs, the longest of which occurs at the bend of the scape. Dorsum of head finely and densely punctate, with a granular appearance; clypeal dorsum similarly but less strongly sculptured. Anterior border of pronotum marginate, the sides not marginate and without a median longitudinal ridge or carina dorsally. Metanotal groove represented by a faint transverse line on the dorsum, not impressed. Outline of dorsal alitrunk in profile with the pronotum and anterior part of the mesonotum sloping upwards to the highest point, which is shallowly convex; the posterior portion of the mesonotum and the propodeum forming a single extremely shallowly concave surface which is weakly sloped posteriorly. Propodeal teeth triangular and acute, the

infradental lamella represented only by a narrow concave crest down each side below the teeth. Sides of alitrunk weakly superficially punctate, densest on the mesopleuron, the metapleuron almost smooth. Pronotal dorsum with extremely fine superficial but quite dense scratch-like longitudinal striation and with a few scattered punctures. Mesonotum anteriorly sculptured as pronotum but posteriorly only weakly punctate. Propodeal dorsum almost smooth, with only the faintest vestiges of sculpture. Dorsal alitrunk without standing hairs, flagellate hairs or any form of specialized pilosity, only with sparse appressed minute ground-pilosity. Spongiform appendages of pedicel segments strongly developed in profile, the subpetiolar process curtain-like and with a deep indentation at about its midlength. Postpetiolar ventral appendage large and lobate. Dorsum of petiole node superficially very shallowly punctate, the posterior spongiform strip lamellate. Postpetiole dorsum smooth, its posterior spongiform strip broadly and shallowly indented medially. Basal spongiform strip of first gastral tergite narrow but dense, not traversed by the basigastral costulae, the latter, however, are sharply defined on the tergite behind the spongiform tissue. Petiole and postpetiole dorsally with appressed short very narrowly spatulate hairs, the posterior margins of each segment with one or two pairs of much larger spatulate hairs which project backwards over the spongiform material. First gastral tergite with fine appressed very sparse ground-pilosity, and with two pairs of longer stout hairs. The first, basally situated pair are erect or nearly so, the second pair, situated close to the apical margin of the tergite, are subdecumbent. Colour light brown.

PARATYPE WORKER. TL 2·5, HL 0·67, HW 0·42, CI 63, ML 0·11, MI 16, SL 0·28, SI 67, PW 0·27, AL 0·68. As holotype.

Holotype worker, **Cameroun**: nr Yaounde, sample 1768 (*G. Terron*) (ENSA).
Paratype. 1 worker with same data as holotype (BMNH).

In the *emarginata*-group four out of the five members of the *chyatha*-complex have broadly scale-like to suborbicular hairs on the head. In *cavinasis* and *sharra* such hairs are evenly distributed over the surface (Fig. 3). In *chyatha* the hairs are restricted to a single transverse band just in front of the occipital margin (Fig. 5), but in *behasyla* they are arranged in two transverse bands, one close to the occiput as in *chyatha* and another situated just behind the level of the frontal lobes (Fig. 4).

Smithistruma cavinasis Brown

Smithistruma (Smithistruma) cavinasis Brown, 1950*b*: 42. Holotype worker, ZAIRE: Ituri Forest between Beni and Irumu, ii.1948, no. 2129 (*N. A. Weber*) (AMNH) [examined]. [See also Brown, 1953*a*: 129.]

WORKER. TL 1·9–2·1, HO 0·52–0·56, HW 0·34–0·37, CI 63–67, ML 0·04–0·06, MI 7–10, SL 0·22–0·26, SI 63–70, PW 0·23–0·25, AL 0·50–0·56 (10 measured).

Mandibular dentition of 5 large teeth following the basal lamella without a diastema, then two slightly smaller teeth and a series of 4 small denticles before the apical tooth. Anterior clypeal margin broadly deeply and evenly concave, the concavity including the whole of the anterior margin except for the anterolateral corners. Lateral margins of clypeus convergent anteriorly and fringed with a continuous row of large flattened spatulate to roughly spoon-shaped projecting hairs which are curved anteriorly. Anterior clypeal margin with a row of 6 broadly scale-like to suborbicular hairs which project out over the mandibles. Dorsum of clypeus and of head with numerous broadly scale-like to suborbicular hairs, densest on the clypeus; such hairs also fringing the lateral borders of the head in full-face view. Flagellate hairs or other pilosity absent. Preocular laminae broad in full-face view and somewhat divergent anteriorly. Antennal scapes narrow basally, bent at about the basal quarter and suddenly broadened, broadest at about this level and the leading edge bluntly subangulate. Dorsal surface of scape with scale-like hairs but leading edge with a series of freely projecting longer narrower hairs, the longest of which occurs at the angle. Eyes of moderate size, 0·11–0·14×HW, the diameter less than the maximum width of the scape. Dorsum of head finely and densely reticulate-punctate, with a granular appearance. Dorsal alitrunk with scattered but conspicuous scale-like to suborbicular hairs, smaller versions of which also occur on the petiole dorsum but which are sparse or absent from the postpetiolar disc and absent from the gaster. Elongate simple hairs absent from alitrunk but present on the petiole (1 pair), postpetiole (2–3 pairs) and base of the first gastral tergite (usually 1–2 pairs but sometimes 3 pairs). Flagellate hairs absent. Alitrunk not marginate laterally, the pronotum without a median longitudinal ridge or carina dorsally. With the alitrunk in profile the mesonotum very slightly raised above the level of the pronotum and propodeum. Metanotal groove not impressed but its site marked by a small step-down from the mesonotal to the propodeal dorsum. Propodeal teeth strong and broad basally, the infradental lamellae very narrow and with a distinctly concave outline. Mesopleuron reticulate-punctate, the remainder of the sides of the

alitrunk unsculptured or only with faint superficial sculpture. Pronotal dorsum finely superficially longitudinally striolate to feebly rugulose, the remainder of the dorsum and the petiole dorsum punctulate. Disc of postpetiole smooth and first gastral tergite unsculptured except for the basigastral costulae. Spongiform appendages massively developed in profile. In dorsal view the sides and posterior margin of the petiole node surrounded by continuous thick spongiform material. The postpetiole with an anterior spongiform transverse strip and with the lateral spongiform material projecting beyond the sides of the disc in dorsal view. Posterior margin of postpetiole disc with a continuous broad spongiform strip which is slightly narrower centrally than at the sides. Base of first gastral tergite with a transverse spongiform band as wide as that on the posterior margin of the postpetiole, and like the postpetiolar strip this is also broadest at the sides and narrow centrally. Colour medium to light brown.

One of only two species in the *emarginata*-group to show broadly scale-like to suborbicular hairs all over the head, *cavinasis* shares this character with *sharra*. Workers of the two species are separated as follows.

cavinasis	*sharra*
Head absolutely and relatively shorter, HL 0·52–0·56, CI 63–67.	Head absolutely and relatively longer, HL 0·58–0·64, CI 56–63.
Antennal scapes absolutely and relatively shorter, SL 0·22–0·26, SI 63–70.	Antennal scapes absolutely and relatively longer, SL 0·26–0·28. SI 73–78.
Posterior margin of postpetiole disc without a row of spatulate to squamate hairs on each side of the midline.	Posterior margin of postpetiolar disc with a row of 5–6 spatulate to squamate hairs on each side of the midline which project backward over the spongiform strip.
Simple elongate hairs present on the postpetiolar disc.	Simple elongate hairs absent from the postpetiolar disc.
Simple elongate hairs present on the basal portion of the first gastral tergite.	Simple elongate hairs absent from the basal portion of the first gastral tergite.

Material examined

Cameroun: Nkoemvon (*D. Jackson*); nr. Yaounde (*G. Terron*). **Zaire**: Ituri Forest (*N. A. Weber*). **Angola**: Dundo (*L. de Carvalho*).

Smithistruma chyatha sp. n.

(Fig. 5)

Holotype worker. TL 2·1, HL 0·62, HW 0·39, CI 63, ML 0·08, MI 13, SL 0·25, SI 64, PW 0·24, AL 0·59.

Mandibles with 5 relatively large teeth followed by two slightly smaller teeth, 4 denticles and an apical small tooth. Basal lamella concealed by clypeus. Anterior clypeal margin broadly and evenly concave, equipped with a row of 7 scale-like hairs which project forward over the mandibles. Of the seven the three central hairs are the smallest, the next one on each side is slightly larger and the outermost on each side (closest to the anterolateral angle) is much larger, transitional in size and shape to the continuous fringe of spatulate anteriorly curved long hairs which project from the lateral clypeal margins. Upper scrobe margins with a single row of adherent suborbicular hairs. Dorsum of head between highest point of vertex and occipital margin with suborbicular hairs present in a transverse band. Remainder of cephalic dorsum and clypeal dorsum without hairs, equipped only with minute pubescence which is somewhat flattened and is only visible under very high magnification. Flagellate hairs absent. Lateral margins of clypeus shallowly convex and convergent anteriorly, the preocular laminae slightly divergent anteriorly in full-face view. Antennal scapes bent very close to the base, broadest at about the point of maximum curvature, with the leading edge broadly rounded and equipped with a series of projecting flattened hairs, the longest of which is about at the point of maximum scape width. Dorsum of scape just behind the leading edge with a sparse row of suborbicular hairs. Maximum diameter of eye about 0·13×HW, less than the maximum width of the scape. Head very conspicuously dorsoventrally flattened, in profile the ventral surface not strongly convex posteriorly and the dorsum only shallowly convex at the vertex. Sides of alitrunk not marginate, the pronotum without a median longitudinal ridge or carina dorsally. Metanotal groove absent. Propodeal teeth strong, broad basally and upcurved at the tips. Dorsal alitrunk without flagellate or simple hairs of any description, only with very widely scattered extremely small inconspicuous short flattened hairs,

appearing hairless under low magnification. Petiole node with a few small flattened hairs on the dorsum but fringed posteriorly and down the sides, in dorsal view, by a row of larger spatulate to squamate hairs. Lateral and posterior margins of postpetiole fringed with a similar row of spatulate to squamate hairs which project over the spongiform tissue. Dorsum of postpetiole and first gastral tergite only with minute pubescence, without hairs of any description. Spongiform appendages of pedicel segments massively developed in profile. In dorsal view the petiole node bounded posteriorly by a transverse spongiform strip which continues down the sides of the node posterolaterally, the lateral margins of the node in front of this with a few decumbent spatulate hairs but without spongiform tissue. Disc of postpetiole in dorsal view surrounded by spongiform tissue, with a transverse strip on the shallowly concave anterior margin and a broader spongiform strip on the convex posterior margin which is narrowed centrally. The spongiform material visible at the sides of the postpetiole disc is narrower and lower than the anterior and posterior strips but can be seen projecting beyond the lateral margins throughout their length. Base of first gastral tergite with a transverse spongiform strip which is overlapped by that on the posterior margin of the postpetiole and which is not narrowed centrally. Pronotal dorsum with dense but very fine low superficial longitudinal rugulae. Mesonotum superficially punctulate. Propodeal dorsum mostly smooth, with scattered small punctulae. Mesopleuron finely punctulat, metapleuron smooth but the sides of the propodeum with scattered quite large punctures. Petiole node faintly punctulate dorsally, the postpetiole smooth and shining. First gastral tergite unsculptured except for the short widely spaced basigastral costulae.

Holotype worker, **Ghana**: Tafo, 15.x.1970, cocoa leaf litter (*B. Bolton*) (BMNH).

Along with *impidora* in the *emarginata*-group *chyatha* shares the characters of strongly reduced pilosity and markedly dorsoventrally flattened head, where the maximum depth of the head is 0·60×HW and the posteroventral convexity of the surface is vestigial. The retention by *chyatha* of some suborbicular hairs on the cephalic dorsum links this species with *behasyla, sharra* and *cavinasis*, where these specialized hairs are much better developed. In the worker *chyatha* and *impidora* are easily separated as the former has a row of adherent suborbicular hairs lining the upper scrobe margins and has a transverse band of suborbicular hairs on the cephalic dorsum between the vertex and the occipital margin. Such suborbicular hairs are absent in *impidora*.

Smithistruma datissa sp. n.

(Fig. 9)

Holotype worker. TL 2·7, HL 0·70, HW 0·54, CI 77, ML 0·12, MI 17, SL 0·34, SI 63, PW 0·34, AL 0·74.

Mandibles armed with 5 relatively large teeth following the basal lamella (which is concealed by the clypeus in the holotype). Distal to the 5 principal teeth are 2 slightly smaller teeth, a row of four denticles and a small apical tooth. Anterior clypeal margin broadly and evenly concave between the anterolateral corners, the margin equipped with 10 scale-like hairs which project forward over the mandibles. These hairs become gradually larger away from the midline but the outermost, at the anterolateral corner, is much the largest and forms an intermediate between the shorter hairs on the anterior margin and the large spatulate to spoon-shaped anteriorly curved hairs which form a fringe on the lateral clypeal margins. In full-face view the preocular laminae slightly divergent anteriorly. Clypeal dorsum more or less smooth centrally but feebly sculptured laterally and anteriorly. Cephalic dorsum densely shallowly reticulate-punctate everywhere. Dorsum of head with numerous small, widely spaced flattened hairs which are subdecumbent to decumbent and are mostly directed anteriorly. In full-face view the sides of the head with a few such hairs projecting, curved anteriorly, most conspicuous on the sides of the occipital lobes. Flagellate hairs absent. Antennal scapes narrow basally, shallowly bent at about the basal third and broadest at this point. The leading edges of the scapes evenly curved at the bend and equipped with a row of projecting spatulate to broadly clavate hairs and an interspersed row of shorter much finer simple hairs. Maximum diameter of eye about 0·13×HW, approximately equal to the maximum width of the scape. Head in profile roughly wedge-shaped, the vertex forming a high narrowly rounded convexity, the ventral surface evenly shallowly convex. Pronotal dorsum without a median longitudinal ridge or carina, not sharply marginate laterally. Alitrunk without flagellate hairs. With the alitrunk in profile the posterior part of the pronotum and anteriormost section of the mesonotum raised into a broad shallowly convex tumulus, the remainder of the mesonotum and the propodeum, which form a single surface without trace of a metanotal groove, markedly depressed below the level of this tumulus. Propodeal teeth short and broadly triangular, the infradental lamellae narrow but clearly visible. Dorsal alitrunk with scattered short flattened hairs which are decumbent to appressed, without standing pilosity of any description. Petiole and

postpetiole dorsally with similar but extremely sparse hairs, the latter also with 4 clavate suberect hairs projecting from the posterior margin. In the holotype a single clavate hair is also present on the left side of the postpetiolar disc, appressed to the surface; this is not matched in the paratypes. First gastral tergite with numerous suberect to erect stout hairs which are simple to weakly clavate apically. Pronotal dorsum predominantly broadly reticulate-punctate but anteriorly and laterally the margins of the punctures tending to run together and form very fine rugulae. Mesonotum and propodeal dorsum more sharply punctate, the sculpture on the latter running between the propodeal teeth and ending about half way down the declivity. Petiole dorsum minutely rugulose, the disc of the postpetiole finely longitudinally costulate. Basigastral costulae sharply developed and conspicuous, the tergite otherwise unsculptured. Alitrunk pleurae mostly smooth centrally but punctulate marginally, a line of punctures separating meso- and metapleuron and a relatively densely punctured patch on the mesopleuron behind the upper half of the front coxa. Spongiform appendages of pedicel segments moderately large in profile. In dorsal view the petiole node with a posterior spongiform strip which is continued down the sides. Postpetiole with a narrow spongiform strip anteriorly and a broader strip bordering the posterior margin which is slightly narrowed medially. Colour dark brown.

Paratype workers. TL 2·6–2·7, HL 0·70, HW 0·54, CI 77, ML 0·12, MI 17, SL 0·34, SI 63, PW 0·32–0·34, AL 0·73–0·74 (2 measured).

As holotype but maximum diameter of eye 0·13–0·15×HW.

Holotype worker, **Rwanda**: Rangiro, ix.1976 (*P. Werner*) (MHN).

Paratypes. 2 workers with same data as holotype (BMNH; MCZ).

The *truncatidens*-complex of this group contains five species. Four of these, *gatuda, hensekta, dendexa* and *truncatidens*, possess conspicuously projecting hairs on the sides of the occipital lobes. In *datissa*, however, such projecting hairs are absent, any hairs which occur on the sides of the occipital lobes being small and curved, usually closely adherent to the head and not freely projecting. *S. datissa* is also separated from *gatuda, dendexa* and *hensekta* by having the postpetiolar disc longitudinally costulate; it is glassy smooth in the last three named. A few specimens of *truncatidens* do show costulae either on part or all of the postpetiole but here the mesonotum has a pair of long erect hairs which are not seen in *datissa*.

Smithistruma dendexa sp. n.

Holotype worker. TL 2·1, HL 0·58, HW 0·41, CI 71, ML 0·08. MI 14, SL 0·26, SI 63, PW 0·26, AL 0·58.

Mandibles closed but dentition apparently as described for *truncatidens*, certainly with 5 large teeth basally, the fourth of which, counting from the base, is the smallest, about the same size as teeth six and seven. Anterior clypeal margin broadly shallowly concave, with a row of small scale-like hairs which project over the mandibles. Lateral margins of clypeus slightly convergent anteriorly, the preocular laminae slightly convergent posteriorly in full-face view. Lateral margins of clypeus equipped with a row of freely projecting anteriorly curved large spatulate to spoon-shaped hairs. Upper scrobe margins divergent posteriorly, with projecting anteriorly curved spatulate to narrowly spoon-shaped hairs which are not as dense nor as broad as those on the lateral margins of the clypeus, and which mostly also curve upwards from their points of origin. Clypeal dorsum and cephalic dorsum with numerous small flattened hairs which are curved anteriorly and appear scale-like in full-face view. Antennal scape bent at the basal third, broadest at or just distal to the bend. Leading edge of scape with a row of freely projecting long stout hairs. Head without flagellate hairs. Dorsum of head densely punctulate and matt, the clypeal dorsum less strongly sculptured. Pronotum not marginate laterally, without a median longitudinal ridge or carina. Metanotal groove absent. With the alitrunk in profile the anterior half of the mesonotum forming the highest point of the outline as a low tumulus. Posterior half of mesonotum and propodeum forming a single feebly sinuate surface. Propodeal teeth triangular and acute, weakly elevated and with a narrow infradental lamella. Dorsal alitrunk with a number of appressed short fine hairs. Large erect hairs on alitrunk restricted to a single long stout pair which are weakly clavate apically and situated on the raised anterior portion of the mesonotum. Without other standing pilosity on the alitrunk and without flagellate hairs. Dorsal surfaces of petiole, postpetiole and first gastral tergite with numerous suberect to erect stout hairs which are feebly clavate apically. Sides of alitrunk mostly smooth but mesopleuron punctate anteriorly and sides of propodeum punctate. Pronotal dorsum finely longitudinally rugulose, without punctate sculpture; mesonotum and propodeal dorsum densely reticulate-punctate. Dorsum of petiole node punctate, the postpetiolar disc unsculptured. First gastral tergite unsculptured except for the sharply defined basal costulae. Spongiform appendages of pedicel segments strongly developed in profile. In dorsal view the petiole node

with a narrow lamellar spongiform strip posteriorly and a similar but narrower strip on the anterior margin of the postpetiole. Sides of postpetiole without projecting spongiform material in dorsal view but the posterior margin with a transverse strip which is broad posterolaterally but considerably narrowed medially. Base of first gastral tergite with a transverse lamellar strip which is traversed by the basigastral costulae. Colour dull yellow to light yellowish brown.

PARATYPE WORKER. TL 2·1, HL 0·60, HW 0·42, CI 70, ML 0·08, MI 13, SL 0·27, SI 64, PW 0·28, AL 0·58. As holotype.

Holotype worker, **Cameroun**: nr Yaounde, sample 1779 (*G. Terron*) (ENSA).
Paratype. 1 worker with same data as holotype (BMNH).

S. dendexa is very closely related to *truncatidens*, an East African species known from Rwanda, Burundi, Kenya and Tanzania. The two species agree in most diagnostic characters but *dendexa* is smaller (compare measurements) and has fine longitudinal rugulae on the pronotal surface, without punctures. In *truncatidens* the pronotum is usually punctate but at most only a few feeble scattered rugulae occur, due to alignment of the walls of adjacent punctures.

Smithistruma emarginata (Mayr)
(Fig. 8)

Strumigenys emarginata Mayr, 1901: 26. Syntype workers, SOUTH AFRICA: Port Elizabeth (*H. Brauns*) (NMV) [examined].
Smithistruma (Smithistruma) emarginata (Mayr) Brown, 1948: 105; 1953*a*: 126.

WORKER. TL 2·4–2·8, HL 0·64–0·70, HW 0·39–0·42, CI 58–64, ML 0·11–0·12, MI 16–19, SL 0·29–0·32, SI 72–80, PW 0·24–0·28, AL 0·62–0·72 (18 measured).

Mandibles with a high truncated triangular basal lamella (concealed by clypeus when mandibles are closed), followed without a diastema by a row of 5 relatively large teeth, 2 slightly smaller teeth and 4 small denticles before the apical tooth. Anterior clypeal margin in full-face view varying from almost transverse to evenly shallowly concave. Lateral margins of clypeus slightly convergent anteriorly, the anterolateral clypeal angles bluntly rounded. Anterior clypeal margin fringed by a series (usually of 6–8) broad scale-like hairs, the lateral margins and corners with an unbroken sequence of long fringing hairs which are flattened to spoon-shaped and which are curved anteriorly on the sides and medially on the anterolateral corners. Dorsum of clypeus and of head behind clypeus with numerous spoon-shaped curved hairs which appear scale-like in full-face view. Sometimes the occipital region with a few simple curved hairs present but these variable in number and degree of development; flagellate hairs never developed. With the head in full-face view the upper scrobe margins and occipital lobes laterally fringed with anteriorly curved spoon-shaped hairs, the head long and narrow (CI <65) and with the eyes plainly visible, projecting beyond the level of the upper scrobe margins. Eyes larger than in any other other known Afrotropical species, their maximum diameter 0·21–0·25×HW, greater than the maximum width of the scape. Scapes long (SI >70), narrow basally, shallowly curved at about the basal third and broadest just distal to this where the leading edge is bluntly subangulate. Leading edges of scapes with projecting flattened to spoon-shaped strong hairs. With the head in profile the dorsum very shallowly impressed between clypeus and vertex, highest at the vertex and sloping down posteriorly to the occipital margin. Dorsum of head finely and densely reticulate-punctulate to granular everywhere. With the alitrunk in profile the central portion of the mesonotum extremely feebly impressed. The metanotal groove not impressed but sometimes represented as a line. Propodeal teeth long and narrow, often slightly upcurved and sometimes weakly sinuate along their length. Infradental lamellae narrow and inconspicuous down the propodeal declivity. Sides of alitrunk not marginate, the pronotal dorsum without a median longitudinal ridge or carina, the pronotal humeri evenly rounded. Pilosity of dorsal alitrunk variable, usually with curved spoon-shaped hairs on pronotum and anterior mesonotum but behind this the hairs longer and finer, subspatulate to cylindrical and simple, and often with one or two pairs suberect to erect. Variation from this more or less median position is shown on the one hand in samples where all the hairs are spoon-shaped and merely vary in size (becoming larger posteriorly), there being no subspatulate or simple hairs developed; and on the other hand by the suppression of the spoon-shaped hairs and their replacement everywhere by simple suberect to erect pilosity. Flagellate hairs never present. Pronotal dorsum very finely and faintly striate, this sculpture sometimes virtually effaced. Mesonotum and usually also propodeal dorsum finely punctulate; sides of alitrunk punctulate. Spongiform appendages of petiole and postpetiole massively developed in profile. In dorsal view the petiole with a spongiform strip on its posterior margin which is strongest posterolaterally.

Anterior margin of postpetiole in dorsal view with a spongiform strip but the sides without. The broadly convex posterior margin of the postpetiole with spongiform tissue very broadly developed at the sides but strongly indented or even interrupted medially, usually the posterior margin of the spongiform material touching the margin of the postpetiolar disc centrally. Petiole dorsum very faintly punctulate to smooth, the disc of the postpetiole always unsculptured and smooth. Dorsal surfaces of petiole, postpetiole and first gastral tergite with elongate simple curved hairs present. First gastral tergite impressed mediobasally, usually sharply so, the impressed area usually including both the central portion of the basal lamellar band of the tergite and the tergal area immediately behind it. Basigastral costulae absent from the impressed area, radiating from each side of it; gaster otherwise unsculptured. Colour yellow to medium brown, sometimes the gaster distinctly darker than the head and alitrunk.

Within its species-group *emarginata* stands very much alone, lacking the pilosity and other characters of the various species-complexes discussed under the species-group diagnosis, but possessing an elongate narrow head, long scapes and a basally indented first gastral tergite coupled with the largest eyes known for a member of this genus in the Afrotropical region.

Despite the wide range of the species it shows relatively little variation, the only notable changes occurring in the form of the alitrunk pilosity as discussed above. Brown (1953*a*: 126) first drew attention to this but noted that, even though his material was sparse, intergrades between the forms were apparently present. This study has confirmed that alitrunk pilosity is by no means stable in *emarginata* and, like Brown, I am of the opinion that the differences observed only represent variation between populations and are not significant at species-level.

MATERIAL EXAMINED

Ivory Coast: Lamto, Toumodi (*J. Levieux*). **Ghana**: Mampong (*P. Room*). **Togo**: Palimé, Kpime Forest (*Vit*). **Burundi**: Imbo Plain (*A. Dejean*). **Zimbabwe**: Sawmills (*G. Arnold*), Gwebi (*K. J. Wilson*); Chishawasha (*A. Watsham*). **Angola**: Dundo, Luachino (*Machado*). **South Africa**: Cape Prov., Port Elizabeth (*H. Brauns*); Algoa Bay (*H. Brauns*); Grahamstown (*L. Weatherill*); Natal, Zululand, Richard's Bay (*J. C. Faure*); St Lucia Lake, Bird Island (*J. C. Faure*).

Smithistruma gatuda sp. n.

(Fig. 11)

HOLOTYPE WORKER. TL 2·2, HL 0·59, HW 0·42, CI 71, ML 0·06, MI 10, SL 0·28, SI 67, PW 0·27, AL 0·60.

Mandibles with 5 relatively large teeth followed distally by two slightly smaller teeth and a series of 4 denticles before the apical tooth. Basal lamella of mandible concealed by clypeus and not visible. Anterior clypeal margin broadly and shallowly concave between the broadly rounded anterolateral angles, the margin equipped with 6 spatulate to spoon-shaped broad hairs which are strongly curved towards the midline and arranged in three pairs; the innermost pair so strongly curved together that the apices are almost touching, the outermost pair intermediate in size to the very large spoon-shaped hair at the anterolateral clypeal corner. Lateral clypeal margins shallowly convex and very feebly convergent anteriorly, equipped with a fringe of anteriorly curved large spatulate to spoon-shaped hairs. Clypeal and cephalic dorsa with a ground-pilosity of small spoon-shaped curved hairs. Sides of occipital lobes in full-face view with freely projecting long feebly clavate hairs. With head in profile the dorsum from the highest point of the vertex back to the occipital margin with a number of long erect to suberect anteriorly curved hairs which are feebly clavate to weakly remiform. Preocular laminae in full-face view weakly divergent anteriorly but reaching a maximum width before meeting the clypeus, and from there to the clypeus slightly convergent. Antennal scapes narrow basally, bent at about the basal third and broadest at about this point, the leading edge subangulate at the point of maximum width and with a series of freely projecting spatulate hairs. Flagellate hairs absent. Clypeus, area between frontal lobes and a short median strip behind that smooth and unsculptured. Remainder of head densely punctate to reticulate-punctate, the punctures and spaces between them glossy. Head in profile with vertex moderately high and narrowly rounded, the ventral surface behind the level of the eye broadly and evenly convex. Maximum diameter of eye distinctly less than maximum width of scape. Pronotum with lateral margins bluntly narrowly rounded but not marginate, the dorsum without a median longitudinal ridge or carina and the humeri lacking flagellate hairs. Anterior portion of mesonotum raised up to level of pronotal dorsum, the remainder of the mesonotum and the propodeal dorsum markedly depressed. Highest point of raised anterior portion of mesonotum with a pair of long erect stout hairs which constitute the only standing pilosity on the dorsal alitrunk. Metanotal groove absent, the mesonotal and propodeal dorsa forming a single surface. Propodeal

teeth long and narrow, slightly upcurved, the infradental lamellae narrow. Alitrunk dorsum with scattered minute appressed hairs and the long mesonotal pair mentioned above. Petiole with one pair of long straight simple hairs, postpetiole with 3–4 pairs. Gastral tergites with numerous straight hairs which are simple to feebly clavate, erect to suberect. Dorsal alitrunk glassy smooth, highly polished with widely separated small punctures. Petiole and the voluminous postpetiole glassy smooth dorsally, the first gastral tergite unsculptured except for the basigastral costulae. Pleurae of alitrunk smooth except for a patch of evenly spaced punctures occupying the central third or slightly more of the mesopleuron. Extreme base of first gastral sternite with sparse but sharply incised punctures. Spongiform appendages of pedicel segments strongly developed in profile. In dorsal view the posterior margin of the petiole node with a transverse strip which is broad and spongiform postrolaterally but which is very narrow and lamellar centrally. The concave anterior margin of the postpetiole with a narrow translucent lamellar strip, the posterior margin with a transverse strip which is broad laterally but contracted down to a narrow isthmus medially. Transverse basal strip of first gastral tergite lamellar rather than spongiform and traversed by the raised basigastral costulae. Colour light glossy brown.

PARATYPE WORKERS. TL 2·2–2·3, HL 0·58–0·60, HW 0·41–0·42, CI 70–71, ML 0·06, MI 10, SL 0·26–0·28, SI 63–67, PW 0·26–0·28, AL 0·60–0·62 (5 measured). As holotype.

Holotype worker, **Rwanda**: Rangiro, 10.vii.1973, 1800m (*P. Werner*) (MHN).

Paratypes. 4 workers with same data as holotype; 1 worker with same data but 6.viii.1973 (MHN; BMNH; MCZ).

A very distinctive species of the *emarginata*-group, *gatuda* is characterized by its distribution of simple pilosity, reduced alitrunk sculpture and glassy smooth body.

Smithistruma hensekta sp. n.

(Fig. 12)

HOLOTYPE WORKER. TL 2·1, HL 0·60, HW 0·41, CI 68, ML 0·10, MI 17, SL 0·24, SI 59, PW 0·25, AL 0·58.

Mandibles with 5 relatively large teeth following the basal lamella (concealed by the clypeus), distal to which are 2 slightly smaller teeth followed by 4 minute denticles and a small apical tooth. Anterior clypeal margin transverse, equipped with 3 pairs of medially curved flattened hairs of which the outermost pair is the largest, forming a transition to the long anteriorly curved spatulate hairs which form a continuous fringe along the lateral clypeal margins. Sides of clypeus feebly convergent anteriorly. With the head in full-face view the sides with numerous straight to slightly curved freely projecting stout hairs which are feebly clavate. Dorsum of clypeus and cephalic dorsum from posterior clypeal margin to highest point of vertex with numerous short scale-like hairs which are curved anteriorly. Scale-like hairs absent from highest point of vertex back to the occipital margin, replaced by numerous distinctly longer erect to suberect hairs which are simple to feebly clavate and mostly slightly curved anteriorly. This broad band of simple hairs occupies the dorsum from the vertex to the occiput and the surfaces of the occipital lobes. Flagellate hairs absent. Antennal scapes curved and broadened at about the basal third, the leading edge of the scape with a freely projecting row of long stout hairs. Maximum diameter of eye 0·15×HW. Cephalic dorsum reticulate-punctate everywhere, with a rough granular appearance. Clypeal dorsum less strongly sculptured than remainder of head. Pronotum not sharply marginate laterally, lacking a median longitudinal ridge or carina dorsally and without flagellate hairs at the humeri. Metanotal groove absent but posterior half of mesonotum very shallowly concave. Propodeal teeth long and narrow, slightly upcurved along their length. Infradental lamellae vestigial. Flagellate hairs absent but pronotal humeri each with a laterally projecting stout hair which is feebly clavate. Dorsal alitrunk with 6 pairs of elongate stout erect hairs which are simple to feebly clavate, and similar hairs are numerous on the petiole, postpetiole and first gastral tergite but tending to be curved posteriorly on the pedicel segments; without other pilosity. Sides of alitrunk densely punctate. Dorsal alitrunk densely punctate, the punctures slightly smaller and more widely spaced on the pronotum than on the mesonotum or propodeum. Dorsum of petiole finely punctate; disc of postpetiole unsculptured and glassy smooth. First gastral tergite unsculptured except for the sharply defined row of basigastral costulae. Spongiform appendages of pedicel segments strongly developed in profile. In dorsal view the petiole node with a spongiform strip along the posterior margin, the spongiform material also extending down the posterolateral surfaces of the node. Anterior postpetiolar margin transverse to exceptionally feebly concave, with a narrow spongiform strip; the posterior margin with a much broader spongiform band which is broadest posterolaterally and narrowed medially. In dorsal view the lateral spongiform tissue of the postpetiole can be seen projecting beyond the outline of the disc. Base

of first gastral tergite with a transverse spongiform band which is overlapped by that on the posterior margin of the postpetiole. Colour uniform dull yellow.

Paratype workers. TL 2·0–2·1, HL 0·58–0·60, HW 0·39–0·41, CI 67–68, ML 0·10–0·11, MI 17–18, SL 0·24–0·25, SI 59–63, PW 0·24–0·26, AL 0·58–0·60 (4 measured).

As holotype but in two workers the mandibles are open and the basal lamella is visible as a broad-based high triangle which tapers strongly to a narrow truncated apex; there is no diastema between the basal lamella and the basalmost tooth of the principal row.

Holotype worker, **Ghana**: Mampong, 9.ii.1970 (*P. Room*) (BMNH).

Paratypes. 4 workers with same data as holotype (BMNH; MHN; MCZ).

Non-paratypic material examined. **Ivory Coast**: Divo (*L. Brader*). **Ghana**: Tafo (*D. Leston*); Mampong (*P. Room*). **Cameroun**: nr Yaounde (*G. Terron*). **Gabon**: Plateau d'Ipassa (*J. A. Barra*). **Angola**: Salazar (*P. Hammond*).

The dimensions of the seven specimens constituting the non-paratypic material are HL 0·56–0·60, HW 0·37–0·40, CI 66–69. MI 17–18, SL 0·24–0·25, SI 60–65. Apart from slight variation in intensity of punctate sculpture on the alitrunk the main variation is only that 6–7 pairs of hairs may be present on the dorsal alitrunk and that the outermost pair of hairs on the anterior clypeal margin (at the corners) may be relatively small, so that the anterior margin may have 3–4 medially curved pairs of hairs.

Within the *emarginata*-group *hensekta* is quickly diagnosed by its transverse anterior clypeal margin and characteristic pilosity as described above. It apppears closest related to *truncatidens* but the two are separated as follows in the worker.

hensekta	*truncatidens*
HW 0·37–0·41, CI 66–69.	HW 0·46–0·54, CI 72–76.
Anterior clypeal margin transverse.	Anterior clypeal margin concave.
Dorsum of head from highest point of vertex to occiput with erect to suberect simple to clavate hairs.	Dorsum of head from highest point of vertex to occiput with anteriorly curved flattened hairs which are suberect only close to occipital margin.
Pronotal humeri each with a laterally projecting stout feebly clavate hair.	Pronotal humeri without laterally projecting hairs.
Dorsal alitrunk with 6–7 pairs of stout erect hairs.	Dorsal alitrunk with 1–2 pairs of stout erect hairs.
Base of first gastral tergite with a broad spongiform strip, the basigastral costulae not traversing it, not running up to the basal margin.	Base of first gastral tergite without a broad spongiform strip, the basigastral costulae running up to the basal margin.
Posterior spongiform appendage of postpetiole not interrupted medially.	Posterior spongiform appendage of postpetiole interrupted medially.

Smithistruma impidora sp. n.

(Fig. 6)

Holotype worker. TL 2·1, HL 0·64, HW 0·40, CI 63, ML 0·06. MI 9, SL 0·25, SI 63, PW 0·25, AL 0·58.

Mandibles equipped with 5 relatively large teeth following the basal lamella (which is concealed by the clypeus). Distal to these are two slightly smaller teeth followed by 4 minute denticles and a small apical tooth. Anterior clypeal margin broadly and evenly concave, equipped with a series of 7 scale-like hairs which project forward over the mandibles. Of these the three central hairs are the smallest and the outermost pair, almost at the anterolateral angles, are by far the largest and form a transition to the fringe of large spatulate to spoon-shaped projecting hairs which line the lateral clypeal margins. Dorsum of clypeus and cephalic dorsum devoid of hairs of any description; upper scrobe margins and sides of head posteriorly devoid of hairs of any description. The cephalic dorsum and clypeal dorsum with scattered minute pubescence which is only visible at high magnification. Sides of clypeus shallowly convex and convergent anteriorly in full-face view. Preocular laminae slightly divergent anteriorly in full-face view. Antennal scapes broad and flattened, bent very close to the base and broadest at the level of the bend or just distal to it. Leading edges of scapes evenly rounded at the bend and with a series of projecting large

spatulate hairs. Cephalic dorsum finely punctulate-granular everywhere, the clypeus shagreened. Head in profile very obviously dorsoventrally flattened, the ventrolateral margin of the head almost flat and the mid-posteroventral convexity of the head vestigial. Eyes of moderate size, the maximum diameter about 0·13×HW, less than the maximum width of the scape. Pronotum not marginate laterally, without a median longitudinal ridge or carina dorsally. With alitrunk in profile the mesonotum and propodeum forming a single almost flat surface, without trace of metanotal groove. Propodeal teeth only slightly elevated from the line of the mesonotal-propodeal dorsa, somewhat upcurved along their length. Infradental lamellae vestigial, merely a minute crest between the propodeal teeth and the metapleural lobes. Dorsal alitrunk and dorsal surfaces of petiole, postpetiole and first gastral tergite lacking standing hairs of any description. The alitrunk and first gastral tergite only with minute appressed pubescence but the petiole and postpetiole bordered posteriorly by a sparse row of indistinct appressed hairs which project backward over the posterior spongiform appendages of the segments. Pronotal dorsum exceedingly feebly sculptured with vestiges of low minute longitudinal rugulae which are almost completely effaced. Mesonotum and propodeal dorsum smooth. Dorsum of petiole node shagreened, postpetiolar disc smooth. First gastral tergite unsculptured except for the feeble and widely spaced basigastral costulae. Sides of alitrunk mostly smooth but with punctures on the mesopleuron and sides of the propodeum. Spongiform appendages of pedicel segments massively developed in profile. In dorsal view the posterior border of the petiole node with a transverse spongiform strip which continues down the sides. Anterior margin of postpetiole shallowly concave and with a transverse spongiform strip, the posterior margin convex at the sides but flattened or slightly indented medially and with a transverse spongiform strip which is narrowed centrally. Sides of postpetiole disc with the more ventrally situated spongiform material projecting beyond the outline and visible in dorsal view; the spongiform tissue outline diverging from front to back. Base of first gastral tergite with a transverse spongiform band which is overlapped by that on the postpetiole. Colour uniform light brown.

Paratype workers. TL 2·1–2·2, HL 0·62–0·64, HW 0·39–0·40, CI 63, ML 0·06, MI 9–10, SL 0·25–0·26, SI 64–65, PW 0·24–0·25, AL 0·56–0·60 (2 measured).
As holotype but maximum diameter of eye 0·11–0·13×HW.

Holotype worker, **Ivory Coast**: Abidjan, Banco Nat. Park, primary forest, dead trunk, 3.iii.1977 (*I. Löbl*) (MNH).
Paratypes. 2 workers with same data as holotype (BMNH; MCZ).

The flattened head and lack of specialized pilosity isolate *impidora* from the other members of the *emarginata*-group. The closest related species is *chyatha*, but here the dorsum of the head retains a transverse band of suborbicular hairs between the vertex and the occipital margin. In *behasyla*, another close species, two such bands of hairs are present, one occipitally and one just behind the frontal lobes, and the head is by no means as strongly dorsoventrally flattened.

Smithistruma sharra sp. n.

(Fig. 3)

Holotype worker. TL 2·1, HL 0·62, HW 0·38, CI 61, ML 0·06, MI 10, SL 0·28, SI 74, PW 0·24, AL 0·60.
Mandibles with 5 relatively strong teeth following the basal lamella without a diastema. Distal to these main teeth are two slightly smaller teeth, followed by 4 minute denticles and an apical small tooth. Anterior clypeal margin strongly and evenly concave, the concavity involving the entire border between the anterolateral angles. Lateral margins of clypeus feebly convex and convergent anteriorly, fringed with a continuous series of large flattened spatulate to spoon-shaped hairs which project freely and are curved anteriorly. Anterior clypeal margin with a row of 6 broadly scale-like to suborbicular hairs which project out over the mandibles. Dorsum of clypeus and remainder of head densely covered with broadly scale-like to suborbicular hairs which are densest on the clypeus; such hairs also fringe the lateral borders of the head in full-face view. Flagellate hairs or other pilosity absent. Preocular laminae broad in full-face view and somewhat divergent anteriorly. Antennal scapes narrow basally, bent at about the basal quarter and suddenly broadened, broadest at about this level and the leading edge evenly rounded with a narrow prominent lamina. Dorsal surface of scape with scale-like hairs but leading edge with a series of freely projecting longer narrower hairs, the longest of which occurs at about the broadest part of the scape. Eyes of moderate size, about 0·11×HW, smaller than the maximum width of the scape. Dorsum of clypeus and area immediately posterior to it very finely reticulate-punctate, with a granular appearance. Remainder of dorsum similarly sculptured but also with scattered very short low rugulae. Dorsal alitrunk with scattered but conspicuous scale-like hairs, which are also conspicuous on the petiole and postpetiole, though

averaging smaller in size. In dorsal view the posterior margin of the postpetiolar disc with a row of 5–6 scale-like to spatulate hairs on each side of the midline which project out over the spongiform tissue; the posterior petiolar margin with a similar row of 4 scale-like hairs (2 on each side of the midline). Standing simple hairs absent from alitrunk, petiole, postpetiole and first gastral tergite; flagellate hairs never developed. Alitrunk not marginate laterally, the pronotum flattened and without a median longitudinal ridge or carina dorsally. With the alitrunk in profile the mesonotum very slightly raised above the level of the pronotum and propodeum. Metanotal groove not impressed but its site marked by the small step-down from the mesonotal to the propodeal dorsum. Propodeal teeth strong, broad basally and slightly upcurved along their length, the infradental lamella very narrow and its outline distinctly concave. Pleurae and sides of propodeum densely punctulate. Pronotal dorsum exceedingly feebly rugulose, the rugulae tending to be irregular but with an overall longitudinal trend. Spaces between the minute rugulae shagreened and dull. Remainder of dorsal alitrunk and petiole dorsum finely punctulate. Disc of postpetiole smooth and shining and first gastral tergite unsculptured except for the basigastral costulae which form an uninterrupted band across the base of the sclerite. Spongiform appendages massively developed in profile. In dorsal view the sides and posterior margin of the petiole node surrounded by continuous thick spongiform material. The postpetiole with an anterior spongiform transverse strip and with the lateral spongiform material projecting beyond the lateral outlines of the disc in dorsal view. Posterior margin of postpetiole disc with a continuous broad spongiform strip which is narrower centrally than at the sides but not broken. Base of first gastral tergite with a transverse spongiform band which is as broad as, and is overlapped by, that on the posterior postpetiolar margin. Colour medium to dark brown.

PARATYPE WORKERS. TL 2·0–2·2, HL 0·58–0·64, HW 0·35–0·38, CI 56–63, ML 0·06–0·08, MI 9–12, SL 0·26–0·28, SI 73–78, PW 0·22–0·26, AL 0·54–0·62 (20 measured).

As holotype but with maximum diameter of eye 0·11–0·15×HW. In some the longitudinal nature of the minute pronotal rugulae is better shown than in others, which are less regular and like the holotype. The maximum number of scale-like hairs fringing the posterior dorsal margin of the petiole node appears to be 6 (3 on each side of the midline) though the outermost on each side may actually arise on the lateral margin of the node and project backward. The basal lamella of the mandible consists of a high rectangle with concave sides, visible in one of the paratypes.

Holotype worker, **Ivory Coast**: Issoneu, 12.x.1980 (*V. Mahnert & J.-L. Perret*) (MHN).

Paratypes. **Ivory Coast**: 14 workers and 1 female with same data as holotype; 9 workers, Man, 7.x.1980 (*V. Mahnert & J.-L. Perret*); 7 workers and 1 female, Dropleu, 10.x.1980 (*V. Mahnert & J.-L. Perret*); 4 workers, Tai Forest, 17.x.1980 (*V. Mahnert & J.-L. Perret*) (MHN; BMNH; MCZ).

Non-paratypic material examined. **Ghana**: Tafo (*D. Leston*); Mampong (*P. Room*). **Cameroun**: Nkoemvon (*D. Jackson*); nr Yaounde (*G. Terron*). **Angola**: Salazar (*P. Hammond*); nr Gubela (*P. Hammond*).

Dimensions of the non-paratypic samples fall within the range given for the paratypes.

The closest relative of *shara* is *cavinasis* which shares the remarkable dense suborbicular pilosity. Details for the separation of the two are given under the latter name.

Smithistruma truncatidens Brown

(Figs 10, 13)

Smithistruma (Smithistruma) truncatidens Brown, 1950*b*: 43, pl. 3, fig. 1. Holotype and paratype workers, TANZANIA: Lupembe (*K. Bock*) (paratype in MCZ) [examined]. [See also Brown, 1953*a*: 127.]

WORKER. TL 2·4–3·0, HL 0·62–0·72, HW 0·46–0·54, CI 72–76, ML 0·10–0·12, MI 14–18, SL 0·28–0·34, SI 58–65, PW 0·30–0·35, AL 0·64–0·78 (12 measured).

Basal lamella of mandible a high rectangle, truncated apically and with shallowly concave sides. The lamella is followed without a diastema by 5 relatively large teeth, two slightly smaller teeth, a row of 4 minutes denticles and a small apical tooth. Anterior margin of clypeus concave and equipped with a series of 8 scale-like hairs, arranged in 4 pairs, which are curved towards the midline and project out over the mandibles. Lateral margins of clypeus with a continuous row of anteriorly curved spatulate to spoon-shaped large hairs which form a fringe around the clypeus. Clypeal dorsum and cephalic dorsum with numerous small flattened hairs which are curved anteriorly and appear scale-like in full-face view. The posteriormost one or two rows of hairs, close to the occipital margin, are longer, narrower and more erect. Sides of head with freely projecting elongate feebly clavate hairs which curve upwards and often weakly forwards from their points of origin. Antennal scapes bent at the basal third, broadest at or just distal to the

bend. Leading edge of scape quite evenly rounded at the bend and with a series of freely projecting long stout hairs. Dorsum of head densely punctate and matt, usually with a coarsely granular appearance but sometimes with the punctures more widely spaced. Clypeal dorsum much less strongly sculptured, frequently shining. Maximum diameter of eye 0·14–0·16×HW. Pronotum not sharply marginate laterally, the dorsum lacking a median longitudinal ridge or carina. With the alitrunk in profile the anterior half of the mesonotum elevated and on the same level as the pronotal dorsum. Posterior half of mesonotum and the propodeum markedly depressed below this level. Metanotal groove absent, the posterior half of the mesonotum and the propodeal dorsum forming a single uninterrupted surface. Propodeal teeth triangular and acute, weakly elevated and with a narrow infradental lamella. Dorsal alitrunk with a number of appressed short hairs which are most easily seen on the pronotum. Erect hairs on alitrunk restricted to a single long stout pair which are weakly clavate apically, situated on the raised anterior portion of the mesonotum. In some samples a shorter second pair of erect hairs is present further back on the mesonotum. Flagellate hairs absent. Dorsal surfaces of petiole, postpetiole and first gastral tergite with numerous suberect to erect stout hairs which are simple or feebly clavate. Sides of alitrunk punctate but the upper and posterior portions of the mesopleuron, the metapleuron and the anteriormost part of the propodeal side forming an extensive smooth area on which punctures are extremely sparse or absent. Dorsum of pronotum punctate, usually densely so but may be more widely scattered in some. Frequently the walls of the individual punctures align to form feeble rugulae and the surface appears granular. Remainder of dorsal alitrunk more sharply reticulate-punctate, the punctures extending onto the propodeal declivity between the teeth. Petiole node punctate dorsally. Disc of postpetiole commonly unsculptured but in many showing faint longitudinal costulae towards the sides. In some, often larger individuals, the costulae are more extensive and occur over most or all of the postpetiolar dorsum. First gastral tergite unsculptured except for the conspicuous basal costulae. Spongiform appendages of pedicel segments strongly developed in profile. In dorsal view the petiole node with a transverse spongiform strip on the posterior margin and the postpetiole with a narrow strip which is broadest posterolaterally but which becomes narrower medially and is vestigial or interrupted at the centre of the margin. At this point the posterior face of the postpetiole disc is itself indented. Base of first gastral tergite with a transverse lamellar strip which is not spongiform and which is traversed by the basigastral costulae, the latter arising at the anterior margin of the sclerite. Colour dull yellow to light yellowish brown.

S. truncatidens is closely related to *datissa, dendexa, gatuda* and *hensekta*. Characters separating *truncatidens* from the last of these are tabulared under *hensekta*. *S. datissa* is a more darkly coloured species which lacks the freely projecting hairs on the sides of the head which are seen in *truncatidens*. It also lacks standing hairs on the dorsal alitrunk and has the postpetiolar disc strongly costulate. In *gatuda* the alitrunk and petiole dorsum are glassy smooth with widely scattered punctures and the sides of the alitrunk are unsculptured except for the central mesopleuron. The eyes are distinctly smaller, measuring only 0·09×HW in *gatuda* as opposed to 0·14–0·16×HW in *truncatidens*. Finally *dendexa*, a smaller species, is separated by its possession of fine longitudinal rugulose sculpture on the pronotum, which is not present in *truncatidens*.

MATERIAL EXAMINED

Rwanda: Kayove (*P. Werner*). **Burundi**: Bujumbura (*A. Dejean*); Bugarama (*A. Dejean*); Imbo Plain (*A. Dejean*). **Kenya**: Nairobi (*V. Mahnert*); nr Narok (*V. Mahnert & J.-L. Perret*); Embu, Irangi Forest Sta. (*V. Mahnert & J.-L. Perret*). **Tanzania**: Lupembe (*K. Bock*).

The *transversa*-group

With the characters of the *emarginata*-group but the basal lamella of the mandible is an evenly rounded broad lobe, visible in full-face view even when the mandibles are closed. Infradental lamella on propodeum broad and conspicuous.

Recorded only from South Africa, *transversa* is certainly a direct derivative of the *emarginata*-group which has modified the shape of the mandibular basal lamella from the high triangular or rectangular structure seen in that group to the low broad lobe which it possesses, without altering the basic dental pattern of the parent stock.

Smithistruma transversa (Santschi)

Strumigenys transversa Santschi, 1913*a*: 258 (diagnosis in key). Holotype worker, SOUTH AFRICA: Natal (not in NMB; presumed lost).

Smithistruma (Smithistruma) transversa (Santschi) Brown, 1948: 105; 1953*a*: 127.

Worker. TL 2·2–2·4, HL 0·62–0·66, HW 0·42–0·46, CI 68–71, ML 0·12–0·13, MI 19–20, SL 0·27–0·28, SI 60–64, PW 0·26–0·28, AL 0·58–0·62 (5 measured).

Basal lamella of mandible an elongate high broadly rounded lobe whose length along the base is approximately the same as the length of the masticatory margin occupied by the principal row of 5 teeth, and which is clearly visible even when the mandibles are closed. Height of the basal lamella equal to that of the longest of the teeth. Principal row of 5 teeth followed distally by 2 slightly smaller teeth and 4 minute denticles before the small apical tooth. Anterior clypeal margin transverse to very shallowly evenly convex, equipped with 8 scale-like hairs which project forwards over the mandibles and which are usually slightly curved medially. Lateral margins of clypeus very slightly convergent anteriorly and with an unbroken series of long broad spatulate to spoon-shaped hairs which project freely and are curved anteriorly. Dorsum of clypeus and cephalic dorsum with numerous scale-like to spoon-shaped anteriorly curved short hairs; those on the clypeus smaller than those on the cephalic dorsum. Upper scrobe margins and sides of the occipital lobes with an unbroken sequence of sharply anteriorly curved spoon-shaped hairs which are closely applied to the surface. Flagellate hairs absent. Antennal scape narrow basally, bent at about the basal third and broadest just beyond the bend. Leading edge of scape with a projecting row of strong spatulate to spoon-shaped hairs, the dorsum of the scape also with spatulate hairs present. Eyes relatively large, maximum diameter 0·18×HW, greater than the maximum width of the scape. Entire dorsum of head finely and densely reticulate-punctate. Pronotum not marginate laterally and without a median longitudinal ridge or carina dorsally. Flagellate hairs absent. Metanotal groove not impressed and propodeal teeth subtended by a broad and conspicuous infradental lamella. Dorsal alitrunk with narrowly spatulate short hairs, most of which are reclinate but a few of which may be subdecumbent. Petiole and postpetiole with similar pilosity and also with elongate quite stout simple hairs which are directed posteriorly. First gastral tergite with a transverse row of 4 erect hairs basally, grouped in pairs on each side of a central broad gap. Remainder of first tergite hairless except for a widely separated pair close to the apical margin. Pleurae of alitrunk mostly smooth, usually with some punctures basally and on upper anterior portion of the mesopleuron. Pronotal and mesonotal dorsa finely and densely reticulate-punctate but dorsum of propodeum mostly or entirely smooth; usually with some laterally situated punctures and with punctures on the declivity between the propodeal teeth. Dorsum of petiole node distinctly broader than long, sometimes indented medially; unsculptured or at most with superficial vestiges of punctate sculpture. Postpetiole smooth and shining. First gastral tergite unsculptured except for the basigastral costulae, which radiate from each side of a smooth median area. Spongiform appendages of pedicel segments strongly developed in profile. In dorsal view the petiole node with a broad posterior strip; the anterior margin of the postpetiole with a narrow strip, the posterior margin bordered by a spongiform strip which is broad posterolaterally but rapidly narrowing medially, very narrow or interrupted centrally where the postpetiole itself is indented. Base of first gastral tergite with a transverse strip which has its anterior free margin concave medially and convex at the sides where the costulae arise. Colour dark brown to blackish brown.

As the holotype of this species has not been found it is necessary to rely on the inadequate descriptions presented by Santschi (1913*a*; 1914*c*). Accordingly I attach the name *transversa* to four short series from Natal and Cape Province in South Africa which match the available descriptions tolerably well.

This species is peripheral to the *emarginata*-group but is isolated by its uniquely shaped mandibular basal lamella and broad infradental lamellae on the propodeum.

Material examined

South Africa: Natal, Zululand, Eshowe (*R. E. Turner*); Dukuduku Forest Res. (*W. L. & D. E. Brown*); Cape Prov., Pondoland, Port St Johns (*R. E. Turner*); Alexandria Forest Res. (*L. Weatherill & W. L. Brown*).

The *terroni*-group

(Fig. 7)

Sharing the characters noted in the *emarginata*-group diagnosis (and particularly resembling the *chyatha*-complex) but with a very distinctly modified mandible form. Blade of mandible narrow and somewhat elongated (MI, however, within range of *emarginata*-group members), with a long diastema between the basal lamella and the basalmost tooth, the diastema much longer than the height of the basalmost tooth. Basal dental series usually of 6 but rarely of 7 small teeth (the number may vary on opposite mandibles in

the same specimen), the next tooth relatively large, by far the largest tooth on the masticatory margin. Distal to this large tooth are 3 small teeth, a single slightly larger tooth, 4 minute denticles and an apical tooth, making a total of 16–17 teeth in all on the margin.

This group, represented by the single species *terroni* from Cameroun, appears to be derived directly from the *chyatha*-complex of the *emarginata*-group by the modification of the mandible outlined above. In the *emarginata*-group the basal lamella is a high truncated triangle or a concave-sided high rectangle which is followed immediately by a row of 5 relatively large teeth, without a diastema between the basal lamella and the basalmost tooth. The 5 teeth constituting the principal row vary in size both between species and sometimes within species, but always one of these five is the largest tooth on the margin. Distal to the row of 5 are 2 smaller teeth (sometimes only fractionally smaller) which are themselves followed by 4 minute denticles and an apical tooth, making a total of 12 teeth in all on the margin. Comparing the mandibles of the two groups it appears that the basal row in *terroni*, which terminates in the relatively very large tooth 7 (or rarely 8), is homologous to the basal row of 5 enlarged teeth in the *emarginata*-group which have been spread out because of the elongation of the blade, and small secondary teeth have developed in *terroni* to fill the gaps so formed. Teeth 6 and 7 of the *emarginata*-group are represented in *terroni* by four teeth, the apicalmost of which is the same as tooth 7 in the *emarginata*-group. Apically both have 4 denticles and a small apical tooth.

Smithistruma terroni sp. n.
(Fig. 7)

Holotype worker. TL 2·6, HL 0·74, HW 0·51, CI 69, ML 0·14, MI 19, SL 0·32, SI 63, PW 0·32, AL 0·76.

Mandibles narrowly triangular, with a distinct diastema separating the basal lamella (concealed by the clypeus but visible in anterior view) from the basalmost tooth, the length of the diastema conspicuously much greater than the height of the basalmost tooth. Counting from the base the mandibles with 6 relatively small teeth followed by a much larger seventh tooth, this tooth by far the largest on the masticatory margin and more than twice larger than those proximal to it. Of the row of six teeth preceding the enlarged seventh the first, third and fifth are larger than the second and fourth, the sixth is slightly smaller than the fifth but slightly larger than the fourth. The large seventh tooth is followed distally by 3 small teeth, a larger tooth, 4 minute denticles and a small apical tooth, making a total of 16 teeth altogether. Both mandibles similarly armed in the holotype but in one of the paratypes the left mandible has an additional minute denticle between the third and fourth tooth from the base, and this mandible thus has a total of 17 teeth. Anterior clypeal margin shallowly concave, with a series of 8 short scale-like hairs which are truncated apically; the outermost pair the largest. Anterolateral angles of clypeus rounded, with medially curved spoon-shaped hairs, the sides of the clypeus divergent posteriorly and with larger anteriorly curved spoon-shaped hairs. In full-face view the preocular laminae divergent anteriorly, the upper scrobe margins divergent posteriorly, the lateral margins of the occipital lobes evenly convex and the occipital margin deeply but evenly concave. Upper scrobe margins just behind the frontal lobes shallowly depressed on each side of a central higher area. Antennal scapes bent near base, flattened and broadest just distal to the bend, the leading edges with a row of freely projecting long spatulate to spoon-shaped hairs. Entire dorsum of head densely punctate. Ground-pilosity everywhere of minute decumbent to appressed stubble-like hairs, without standing pilosity of any description on the cephalic dorsum and without flagellate hairs. Eye moderate in size, with more than 15 ommatidia. Pronotum marginate anteriorly, the alitrunk without lateral margination but the propodeal dorsum separated from the sides by bluntly rounded angles. In dorsal view the pronotum without a median longitudinal ridge or carina and the metanotal groove absent. In profile the mesonotum shallowly convex, confluent with the shallowly sloping surface of the pronotum anteriorly but sloping more steeply posteriorly. The posterior half of the mesonotum forming a single surface with the propodeal dorsum. Propodeal teeth strong and stout, the infradental lamella vestigial and represented only by a narrow rim down the concavity of the declivity below the propodeal teeth. Sides of alitrunk mostly with scattered quite sharply defined relatively large punctures, the spaces between which are smooth, but the anterior portion of the mesopleuron finely reticulate-punctate, the punctures much smaller than elsewhere. Dorsal alitrunk with scattered punctures, the pronotum also with vestiges of exceptionally fine rugulae. Dorsal alitrunk only with scattered minute appressed hairs, without standing pilosity of any description and lacking flagellate hairs. Pedicel segments in profile with spongiform appendages massively developed. Dorsum of petiole node sculptured with strong scattered punctures and bordered posteriorly by a continuous transverse spongiform strip which is

densest posterolaterally. Postpetiole in dorsal view with the disc smooth and unsculptured, completely surrounded by dense spongiform material. Posterior transverse spongiform strip of postpetiole feebly sinuate medially but not distinctly indented. Base of first gastral tergite with a narrow but dense transverse spongiform strip. Basigastral costulae narrow and sharply defined, not traversing the basal spongiform tissue. Pedicel segments and gaster without standing pilosity, with minute appressed ground-pilosity and the posterior margins of the petiole and postpetiole with 1–2 pairs of larger appressed spatulate hairs which project backwards over the spongiform strips. Colour black.

Paratype workers. TL 2·5–2·6, HL 0·72–0·74, HW 0·49–0·51, CI 68–69, ML 0·13–0·14, MI 18–19, SL 0·31–0·32, SI 62–63, PW 0·32–0·33, AL 0·74–0·78 (3 measured).

As holotype but with 7–8 short hairs bordering the concave anterior clypeal margin and one paratype with an extra mandibular tooth as discussed above.

Holotype worker, **Cameroun**: nr Yaounde, sample 1911 (*G. Terron*) (ENSA).

Paratypes. 4 workers with same data as holotype (ENSA; BMNH).

The unique construction of the mandible immediately separates *terroni* from all its Afrotropical congeners.

The *weberi*-group

(Figs 14–16)

Antennae with six segments. Basal lamella of mandible a high triangle which is truncated apically or a high rectangle with concave sides, never a low rounded lobe. Often a small diastema present between the basal lamella and the basalmost tooth. Principal dental row of mandible with 5 teeth but the next two teeth distally may sometimes also be enlarged. Sculpture very coarse on body and usually also coarse on head, very characteristic, the pronotum with strong rugae or sulci which are usually longitudinal. Anterior clypeal margin in full-face view most often approximately transverse but sometimes extremely shallowly concave or convex. Lateral and anterior margins of clypeus with a series of irregular projecting simple hairs which may be acute, truncated or even feebly clavate apically, but which are never spatulate nor spoon-shaped and which do not form an orderly fringing row such as is characteristic of the *emarginata*- and related groups. Body pilosity consisting of an array of fine simple hairs which are usually dense and are generally wavy, twisted, bent or otherwise deformed, but without bizarre hairs. Flagellate hairs absent from pronotal humeri or at least indistinguishable from the other pilosity. Leading edges of antennal scapes with freely projecting simple hairs. Pronotum not marginate laterally and lacking a median dorsal ridge or carina. Propodeum without or at most with a vestigial infradental lamella.

The obvious outstanding character of this peculiarly African group of species is the heavy coarse sculpture. No other species or species-group known in the world approaches the members of the *weberi*-group in this aspect and this character alone will serve to separate the twelve members of the group from their Afrotropical congeners.

The group falls into two informal complexes depending on whether the postpetiolar disc is sculptured or smooth. In the *minkara*-complex (*enkara, minkara, nykara*) the disc of the postpetiole is strongly and clearly longitudinally costulate. Of the three species in this complex two are West African, with *minkara* known only from Ivory Coast and *enkara* from Ivory Coast and Ghana; the third species, *nykara*, has only been found in Zimbabwe to the present. In the second, *weberi*-complex (*arahana, fenkara, kerasma, malaplax, mekaha, placora, synkara, tolomyla, weberi*), the postpetiolar disc is smooth and shining. All the species of this complex are from West or central Africa and the species range from Nigeria to Angola.

Smithistruma arahana sp. n.

Holotype worker. TL 2·5, HL 0·65, HW 0·40, CI 61, ML 0·05, MI 8, SL 0·28, SI 70, PW 0·30, AL 0·64.

Anterior clypeal margin transverse, the anterolateral angles rounded and the lateral margins feebly divergent posteriorly. Outline of preocular laminae shallowly convex in full-face view, broadest at about their midlength and slightly convergent both anteriorly and posteriorly. Lateral margins of clypeus with simple projecting hairs, the shorter of which are curved anteriorly and the longer of which curve upwards or forwards and upwards. Clypeal and cephalic dorsa equipped with simple fine ground-pilosity, the hairs of the ground-pilosity short and arched forward so that their apices are in contact or nearly in contact with the surface. Projecting above the ground-pilosity are longer stouter simple hairs which are erect or nearly so.

On the clypeal dorsum most of these hairs curve forward then upward but the posteriormost clypeal row are shallowly sinuate and are also the longest. Behind the clypeus similar erect curved to sinuate hairs are present, none of which are longer than the posterior clypeal row. Close to the occipital margin are a few hairs which are angled and have their apical portions narrowly flagellate. In full-face view the sides of the head with numerous projecting simple hairs. Antennal scapes slightly bent in the basal third, broadest at about the midlength, the leading edge with anteriorly projecting simple hairs most of which are upcurved in their distal halves. Dorsum of head coarsely and very densely reticulate-rugulose everywhere, the clypeus less strongly sculptured. Promesonotum not marginate, the pronotal dorsum without a median longitudinal carina. Metanotal groove not impressed. Propodeal teeth broad and triangular, short, the infradental lamellae vestigial and represented only by a narrow rim; outline of the propodeal declivity in profile distinctly concave. Sides of pronotum and propodeum coarsely rugose, the pleurae smooth. Mesopleuron with a dense vertical band of fine punctulae close to its junction with the metapleuron but otherwise the pleurae only with very widely scattered fine punctulae. Promesonotal dorsum coarsely and densely rugose, the propodeal dorsum smooth except for a few feeble anteriorly situated punctures. Dorsal alitrunk with numerous fine simple hairs. Spongiform appendages of pedicel segments massively developed in profile. Outline of petiolar ventral process concave at about its midlength, the ventral postpetiolar lobe very large indeed. In dorsal view the petiole node rugose and distinctly broader than long, with a very thick posterior ruff of dense spongiform material, the thickness of which is greater than the length of the exposed dorsum of the node. Laterally the spongiform tissue laps around the sides of the node almost to the anterolateral angles. Disc of postpetiole in dorsal view completely surrounded by dense thick spongiform material, the disc uneven and with scattered punctures, not glassy smooth as is usual in the *weberi*-complex but lacking the strong costulae characteristic of the *minkara*-complex. Anterior margin of postpetiolar disc bordered by a dense spongiform strip, the sides with dense spongiform tissue which is narrowest anteriorly and extremely broad posterolaterally. Posterior spongiform strip broad and with a narrow median cleft. Base of first gastral tergite with a broad very finely and densely spongiform transverse strip, the tergite posterior to this with short basigastral costulae. Dorsal surfaces of petiole, postpetiole and gaster with numerous fine simple hairs. Colour dull brownish yellow to light brown.

Paratype worker. TL 2·6, HL 0·70, HW 0·43, CI 61, ML 0·06, MI 9, SL 0·30, SI 70, PW 0·32, AL 0·70. As holotype but disc of postpetiole less noticeably punctate.

Holotype worker, **Cameroun**: nr Yaounde, sample D2 (*G. Terron*) (ENSA).
Paratype. 1 worker, **Cameroun**: nr Yaounde, sample 2419 (*G. Terron*) (BMNH).

Among the members of the *weberi*-group six species combine the characters of having the postpetiolar disc without dense costulate sculpture and having the metanotal groove unimpressed. Of these only *arahana* has the spongiform tissue behind the petiole node very densely and massively developed. In dorsal view the spongiform material is thicker than the length of the node in *arahana*, whereas in the five other species (*fenkara, malaplax, placora, synkara, tolomyla*) it is decidedly narrower than the length of the node, in some being merely a lamella.

Smithistruma enkara sp. n.

(Fig. 15)

Holotype worker. TL 2·4, HL 0·63, HW 0·41, CI 65, ML 0·08, MI 13, SL 0·28, SI 68, PW 0·28, AL 0·62.
Dentition as described for *minkara* but basal lamella of mandible (from non-paratypic material) a high truncated rectangle with concave sides; a small diastema present between the basal lamella and the basalmost tooth. Anterior clypeal margin transverse, the anterolateral angles of the clypeus rounded and the sides slightly convergent anteriorly. Lateral margins of clypeus with numerous projecting curved to flagellate simple fine hairs which are also present bordering the sides of the head. Dorsal surface of clypeus and dorsal surface of head with abundant fine simple hairs which are irregular to flagellate and mostly arched over so that the apices of most of them are directed back down towards the surface or are roughly parallel with the surface. All the cephalic hairs are fine and simple, without erect to suberect longer stouter straight hairs pointing up from the dorsum. Entire dorsum of head strongly reticulate-rugulose. Antennal scapes only very feebly bent at about the basal third, broadest at about the midlength, the leading edges arched convex and equipped with projecting simple hairs similar to those on the cephalic dorsum. Maximum diameter of eye 0·12×HW. With the alitrunk in profile the mesonotum slightly elevated, the metanotal groove not impressed. Sides of pronotum not sharply marginate and the dorsum lacking a median longitudinal ridge or carina. Propodeal teeth narrow and acute, subtended by a vestigial infradental lamella. Pronotum, mesonotum, petiole, postpetiole and gastral tergites with numerous fine

simple flagellate hairs, many of which are arched over towards the surface, as on the head. Sides of pronotum rugose, pleurae and sides of propodeum punctate. Pronotal dorsum densely coarsely longitudinally rugose, with a few cross-meshes; spaces between the rugae mostly narrow and smooth. Mesonotum with irregular strong rugae the spaces between which are punctate. Propodeal dorsum punctate, the declivity smooth. Petiole node irregularly but strongly rugose dorsally, the postpetiolar disc strongly longitudinally costulate-rugose. Basigastral costulae dense and strongly developed, extending almost the length of the sclerite centrally, less extensive on the sides. Spongiform appendages of pedicel segments massively developed in profile. In dorsal view the posterior margin of the petiole node with a broad spongiform strip whose posterior border is concave medially and which is broadest posterolaterally where it forms a rounded lobe. Postpetiole in dorsal view with the disc completely surrounded by thick spongiform material which is broadest posterolaterally and has the posterior strip indented medially. First gastral tergite with a broad spongiform band basally which is overlapped by the posterior spongiform strip of the postpetiole. Colour dark brown, the gaster blackish brown.

PARATYPE WORKER. TL 2·4, HL 0·63, HW 0·40, CI 63, ML 0·07, MI 11, SL 0·28, SI 70, PW 0·28, AL 0·62. As holotype but maximum diameter of eye 0·13×HW.

Holotype worker, **Ivory Coast**: Abidjan, Banco Nat. Pk., primary forest, 3.iii.1977, in dead trunk (*I. Löbl*) (MHN).

Paratype. 1 worker with same data as holotype (BMNH).

Non-paratypic material examined. **Ghana**: Tafo (*D. Leston*); Tafo (*C. A. Collingwood*). **Ivory Coast**: Lamto (*W. H. Gotwald*). **Cameroun**: nr Yaounde (*G. Terron*).

The five specimens constituting the non-paratypic material are very close to the holotype but have some minor differences. Principal among these is a rugulose propodeal dorsum, not seen in the type-series. With so little material available I cannot assess the significance of this and I am not prepared to split them further at present.

Of the three species in this group which possess a sculptured postpetiolar disc, *minkara* is easily differentiated by its very long narrow head, CI 54–58 as opposed to CI 63–68 in *enkara* and *nykara*. These last two species are differentiated by the characters given in the key plus the fact that *nykara* has long stout evenly curved clypeal hairs as well as the finer pilosity, such long hairs being absent in *enkara*. With the pedicel segments in profile the lateral spongiform appendage of the postpetiole touches or is confluent with the transverse strip bordering the anterior postpetiolar margin in *enkara*; in *nykara* there is a distinct gap between them.

Smithistruma fenkara sp. n.

HOLOTYPE WORKER. TL 2·4, HL 0·67, HW 0·43, CI 64, ML 0·07, MI 10, SL 0·31, SI 72, PW 0·30, AL 0·66.

Dentition not clearly visible as mandibles closed but apparently like that described for *malaplax*. Anterior clypeal margin transverse, the sides irregular, shallowly convex and weakly convergent anteriorly. With the head in full-face view the lateral clypeal margins with a few simple short anteriorly curved hairs on the posterior half, but the pilosity dominated by the numerous stout hairs which project anterolaterally are clavate apically and upcurved in their distal half to third. Sides of head with numerous similar projecting clavate hairs which are curved forwards or upwards, the posterior curve of the occipital lobes with weakly flagellate hairs replacing the clavate pilosity. In profile the clypeal dorsum with clavate hairs anteriorly which curve upwards. The surface of the clypeus behind these hairs is shallowly concave and hairless. Posteriorly the clypeal dorsum with a transverse row of sinuate clavate erect hairs which are slightly longer than those situated anteriorly. Dorsum of head from posterior margin of clypeus to vertex with simple short ground-pilosity which is curved anteriorly and closely applied to the surface, and with longer stout clavate hairs which are erect to suberect, feebly inclined or curved anteriorly, all of about the same length and stature and about equal in length to the posterior clavate clypeal row. Sloping portion of head behind the vertex and in front of the occipital margin with weakly flagellate hairs replacing the clavate pilosity. Antennal scapes feebly bent at about the basal third, the leading edge with a projecting row of long curved hairs which are weakly clavate apically. Maximum diameter of eye 0·16×HW. Entire dorsum of head densely reticulate-rugulose. Pronotum not marginate laterally, without a median longitudinal ridge or carina dorsally. With the alitrunk in profile the metanotal groove absent, the propodeal teeth narrowly triangular and subtended by a narrow infradental lamella whose free margin is evenly concave. Sides of pronotum and propodeum irregularly rugulose, the pleurae punctate but the metapleuron mostly smooth centrally. Pronotal dorsum strongly longitudinally rugose, with a few cross-meshes and with the interspaces weakly punctate to granular. Mesonotum more strongly reticulate-rugose than pronotum, especial-

ly posteriorly. Propodeal dorsum punctate, with rugulae at the sides and one or two weak transverse rugulae close to the declivity, the latter smooth. Petiole node irregularly rugose dorsally, the postpetiole smooth and shining. First gastral tergite unsculptured except for the strong basigastral costulae. Dorsal surfaces of pronotum, mesonotum, petiole, postpetiole and gaster with numerous fine weakly flagellate hairs. Spongiform appendages of pedicel segments massively developed in profile. In dorsal view the petiole node with a broad posterior strip which is narrowed posteromedially. Postpetiole completely surrounded by thick spongiform material in dorsal view, the posterior strip deeply indented medially. First gastral tergite with a thick basal spongiform ruff. Colour medium brown, the gaster blackish brown.

PARATYPE WORKER. TL 2·3, HL 0·68, HW 0·43, CI 63, ML 0·07, MI 10, SL 0·30, SI 70, PW 0·30, AL 0·63. As holotype.

Holotype worker, **Angola**: Dundo, Carisso Park, gallery forest, R. Luachimo, 7°22′S, 20°50′E, 26.iv.1963, 'berlesate by native collector' (MCZ).
Paratype. 1 worker with same data as holotype (BMNH).

S. fenkara is closest related to *placora, tolomyla* and *synkara*. The characters linking them and those which separate them are noted under *synkara*.

S. fenkara is separated from *arahana* by its massive development of the posterior petiolar spongiform appendage, as discussed under the latter name; *fenkara* is differentiated from *malaplax* by the lack of specialized hairs on the head behind the clypeus in the latter.

Smithistruma kerasma sp. n.

(Fig. 16)

HOLOTYPE WORKER. TL 2·5, HL 0·68, HW 0·44, CI 65, ML 0·06, MI 9, SL 0·30, SI 68, PW 0·32, AL 0·69.

Mandibular dentition (from a paratype) consisting of a high truncated rectangular basal lamella with concave sides, followed by a small diastema and a principal row of 5 relatively large teeth. Distal to this with 2 slightly smaller teeth, 4 minute denticles and a small apical tooth. Anterior clypeal margin broadly shallowly convex, sides of the clypeus irregular and only very weakly convergent anteriorly to the rounded anterolateral angles. Preocular laminae weakly convex in full-face view, the lateral margins of the head rugular and uneven. Lateral margins of clypeus in full-face view with a few simple anteriorly curved short hairs and with longer stouter simple hairs which project anterolaterally from the margin and are curved upwards. Sides of head with abundant fine simple projecting hairs which are curved anteriorly in their apical halves. Hairs on clypeal dorsum fine, more or less vertical and curved towards the midline. Dorsum of head with abundant fine simple hairs which are erect or suberect basally but which are angled anteriorly in their apical halves, those situated more posteriorly on the dorsum being in general more strongly bent forward than those situated more anteriorly. The most strongly bent hairs are inverted L-shaped. All hairs on dorsal head approximately the same size and stature, without hairs which are obviously longer and stouter than others. Dorsum of head coarsely irregularly reticulate-rugose, the clypeus similarly but less intensely sculptured. Antennal scapes scarcely bent basally, broadest at about the midlength and the leading edge with projecting curved simple hairs which also occur on the dorsum of the scape. Maximum diameter of eye 0·16×HW. Pronotum not marginate laterally, without a median longitudinal ridge or carina dorsally. In profile the alitrunk with the mesonotum strongly convex, sloping down posteriorly to a broad, shallow but distinctly impressed metanotal groove. Dorsal outline of propodeum raised behind the metanotal groove, then sloping downwards to the triangular propodeal teeth. Infradental lamellae of propodeum vestigial, their free margins strongly concave. Pronotal and mesonotal dorsa with numerous erect to suberect long fine simple hairs which are bent in their apical halves and often directed anteriorly. Dorsal surfaces of petiole, postpetiole and gaster with elongate simple hairs which are subflagellate to flagellate or sometimes arched over. Dorsal (outer) surfaces of middle and hind tibiae with projecting simple subflagellate hairs. Sides of pronotum and propodeum coarsely rugose, the pleurae punctate; the punctures of the mesopleuron smaller denser and more sharply defined than those on the metapleuron. Pronotal dorsum coarsely longitudinally rugose, the rugae broad and high and the spaces between them smooth. Mesonotum, metanotal groove and base of propodeal dorsum strongly rugose but the rugae less massive and less regular than on the pronotum. Central area of propodeal dorsum with irregular punctures, declivity smooth. Petiole dorsum coarsely rugose, postpetiole dorsum smooth and shiny. First gastral tergite unsculptured except for the regular strong short basal costulae. With pedicel segments in profile the spongiform appendages massively developed. In dorsal view the posterior margin of the petiole with a very broad spongiform strip which has its free posterior margin shallowly concave medially and which is broadest posterolaterally where its length is equal to that of the free side of the node in front of it. Disc of

postpetiole thickly surrounded by spongiform material on all sides in dorsal view. The broadly and shallowly concave anterior margin of the postpetiole is equipped with a thick ruff-like transverse spongiform band which is contiguous with the lateral spongiform material on each side. Convex posterior margin of postpetiolar disc indented medially and bearing an extremely broad spongiform band whose posterior margin is also indented medially. The spongiform material on each side of the median indentation is as broad as the disc is long. Base of first gastral tergite with a thick spongiform ruff from which the basigastral costulae emerge. Colour dark brown.

Paratype workers. TL 2·5–2·6, HL 0·68–0·70, HW 0·44–0·45, CI 64–66, ML 0·06–0·07, MI 9–10, SL 0·30–0·31, SI 68–70, PW 0·32–0·33, AL 0·68–0·72 (9 measured). As holotype.

Holotype worker, **Cameroun**: Nkoemvon, 16.iii.1980 (*D. Jackson*) (BMNH).
Paratypes. 9 workers with same data as holotype (BMNH; MHN; MCZ; ENSA).

Among the nine species of this group which have the postpetiole unsculptured only three (*kerasma, mekaha, weberi*) have the metanotal groove impressed. *S. kerasma* and *mekaha* differ together from *weberi* as follows.

kerasma and *mekaha*	*weberi*
Median indentation of posterior spongiform appendage of postpetiole shallow, not approaching the margin of the disc.	Median indentation of posterior spongiform appendage of postpetiole reaching the margin of the disc.
Spongiform material bordering margin of postpetiole posteriorly as wide from front to back as the disc of the postpetiole is long.	Spongiform material bordering margin of postpetiole posteriorly distinctly narrower from front to back than the disc of the postpetiole is long.
Propodeal teeth long, the infradental lamella vestigial and its free margin evenly concave.	Propodeal teeth short and broad, the infradental lamella conspicuous and its free margin straight or feebly sinuate, not evenly concave.
All hairs on dorsum of head of same construction and approximate size, not divided into appressed small ground-pilosity and much larger erect subclavate hairs.	Hairs on dorsum of head of two forms, divided into small appressed ground-pilosity and much larger erect subclavate hairs.
Larger species, HL 0·68–0·70 HW 0·44–0·47.	Smaller species, HL 0·61, HW 0·39.
Second tooth of principal mandibular row the longest, the first (basalmost) and third about equal in length.	Second tooth of principal mandibular row the longest but the first (basalmost) very much smaller than the third.

S. kerasma and *mekaha* are a very closely related pair but are quickly separated by the form of the cephalic pilosity. In *kerasma* the principal cephalic hairs are erect or suberect basally but pass through an obtuse angle so that their apical halves are directed anteriorly. In *mekaha* the cephalic hairs lack this structure, instead being evenly arched forward from base to apex, their apices generally in contact with the surface of the head some distance in front of their point of origin.

Smithistruma malaplax **sp. n.**

Holotype worker. TL 2·1, HL 0·64, HW 0·40, CI 63, ML 0·07, MI 11, SL 0·28, SI 70, PW 0·28, AL 0·62.

Basal lamella of mandible a high truncated rectangle with concave sides, separated from the principal tooth row by a small diastema. Of the 5 teeth following the diastema the first is the shortest and the second is the longest. The principal row of 5 teeth is followed by two slightly smaller teeth, 4 minute denticles and a small apical tooth. Anterior clypeal margin transverse, the sides feebly convergent. In full-face view the lateral clypeal margins with a more ventrally situated series of projecting fine simple hairs which are curved anteriorly, often sharply so. Situated above this row on the sides of the clypeus are numerous longer stouter weakly clavate hairs which project laterally or anterolaterally and are upcurved or backcurved in the distal third to half of their length. Clypeal dorsum with very sparse short anteriorly curved simple ground-pilosity

and with numerous erect to suberect long stout weakly clavate hairs. Anteriorly on the clypeus the stout hairs curve forward from their bases then upwards and usually slightly backwards. Posteriorly on the clypeus is a single transverse row of stout clavate hairs which are much longer than those situated anteriorly and which are vertical, weakly sinuate throughout their length and weakly directed anteriorly at their apices (from the non-paratypic material as the posterior row of clavate hairs is crushed down in the holotype). Dorsum of head behind clypeus only with simple fine pilosity, without the long weakly clavate hairs which are so obvious on the clypeus; the fine hairs simply anteriorly curved and closely applied to the surface in the area behind the clypeus but posterior to that, approaching the vertex and beyond, the hairs are arched, looped or weakly flagellate. With the head in full-face view the sides with projecting simple hairs similar to those on the dorsum, weakly flagellate, arched or looped. Scape feebly bent at its basal third, broadest at about the midlength and the leading edge with a row of projecting simple curved hairs. Maximum diameter of eye 0·16×HW. Pronotum not marginate laterally, without a median dorsal ridge or carina. With alitrunk in profile the metanotal groove absent, not impressed. Propodeal teeth triangular and acute, subtended by a narrow evenly concave infradental lamella. Dorsal surfaces of pronotum, mesonotum, petiole, postpetiole and gaster with numerous fine simple hairs which are arched, looped or weakly flagellate. Sides of pronotum and propodeum reticulate-rugulose, the pleurae punctate. Promesonotal dorsum densely and strongly rugulose. Propodeal dorsum rugulose and with vestigial punctures. Dorsum of petiole node rugulose, the postpetiole smooth and shining. First gastral tergite unsculptured except for the strong basigastral costulae. Spongiform appendages of pedicel segments strongly developed in profile. In dorsal view the broad posterior strip of the petiole node concave medially. Postpetiole surrounded by spongiform material in dorsal view, the broad posterior strip indented medially. Spongiform material at base of first gastral tergite forming a narrow band which is mostly overlapped by the posterior postpetiolar spongiform tissue, the area of the first tergite immediately behind the spongiform material lamellar and traversed by the basigastral costulae. Colour orange-brown, the gaster blackish brown.

Holotype worker, **Angola**: nr Gubela, 17.iii.1972, forest litter (*P. Hammond*) (BMNH).

Non-paratypic material examined. **Nigeria**: Ibadan (*B. R. Critchley*). **Zaire**: Yangambi (*M. Maldague*). **Angola**: R. Kahingo (*Mwaoka*).

The non-paratypic material consists of three specimens, one from each locality, which resemble the holotype in all main characters but which show some sculptural variation. With so few specimens available I cannot guess at the significance, or lack of significance, of this variation and so leave all as a single species for the time being. The species is characterised and separated from other members of the group by having a smooth postpetiolar disc, no metanotal groove, and by having specialized long stout clypeal hairs which are absent from the dorsum of the head behind the clypeus where only fine simple hairs are present. Other members of the group having a smooth postpetiole and lacking a metanotal groove (*arahana, fenkara, placora, synkara, tolomyla*) all have very obvious specialized hairs on the cephalic dorsum which are similar to or even longer than those on the clypeus.

Smithistruma mekaha sp. n.

Holotype worker. TL 2·6, HL 0·70, HW 0·46, CI 66, ML 0·06, MI 9, SL 0·31, SI 65, PW 0·32, AL 0·71.

Principal dental row of 5 teeth, dentition as described for *kerasma*. Anterior clypeal margin extremely shallowly convex, the anterolateral angles rounded. Lateral margins of clypeus very feebly divergent posteriorly, the preocular lamellae continuing the lines of the clypeal margins in full-face view but slightly convergent posteriorly. Lateral and anterior margins of clypeus with fine simple hairs which are directed forward or forward and upward, the clypeal dorsum with some erect curved fine hairs. Behind the level of the clypeus all hairs on the cephalic dorsum are fine, simple and strongly arched forward so that their apices are in contact with the surface some distance in front of their bases. Lateral margins of head with some freely projecting fine hairs and with curved hairs like those on the dorsum. Upper scrobe margins divergent behind the frontal lobes, the sides of the head behind the level of the scrobes irregularly convex. Occipital margin concave and with a narrow bordering rim or flange. Clypeus irregularly rugose, the sculpture much weaker than on the cephalic dorsum. Dorsum of head coarsely irregularly rugose to coarsely punctate-rugose, the rugae in places surrounding small foveolate punctures from which the hairs arise. Scapes narrow at base, broadening to a maximum at about the midlength then narrowing again to the apex. Leading edges of scapes with fine projecting simple hairs. Pronotum not marginate laterally, without a median longitudinal ridge or carina. Metanotal groove shallowly but conspicuously impressed. In profile the propodeal teeth short and stout, the infradental lamellae very narrow and with concave free margins.

Sides of pronotum, metapleuron and propodeum coarsely irregularly rugose, contrasting strongly with the mesopleuron which is sculptured with fine sharply incised small separate punctures on a smooth surface. Pronotal dorsum very coarsely irregularly longitudinally rugose, the rugae and the small spaces between them smooth. Mesonotum similarly sculptured, propodeum rugose towards the sides but the centre of the dorsum with a few deformed punctures. Dorsal alitrunk with numerous fine simple hairs. Spongiform appendages of pedicel segments massively developed. In profile the ventral spongiform appendage of the petiole forming a lobe anteriorly which is suddenly narrowed at about the level of the ascending face of the node and then broadened again behind, as if a broadly triangular notch had been cut in the ventral margin of the spongiform tissue. Ventral spongiform lobe of postpetiole very large. Petiole node in dorsal view coarsely sculptured, with a thick posterior ruff of spongiform material which is almost as thick at its midlength (its narrowest point) as the dorsum of the node is long, the spongiform material becoming even thicker laterally. Postpetiolar disc unsculptured, smooth and shining, surrounded on all sides by dense spongiform tissue. Anterior margin of postpetiole bounded by a transverse spongiform strip, the sides bounded by projecting spongiform tissue which is narrowest anteriorly. Posterior spongiform strip of postpetiole with its posterior margin very weakly indented medially, the indentation very shallow and not approaching the margin of the disc; with a thick band of spongiform material separating the posteriormost point of the disc from the base of the impression. Base of first gastral tergite with a broad dense spongiform strip which is not traversed by the basigastral costulae; the latter short but strongly defined on the base of the tergite proper. Pilosity of petiole, postpetiole and gaster entirely of fine simple hairs. Colour brown.

Paratype worker. TL 2·6. HL 0·70, HW 0·47, CI 67, ML 0·07, MI 10, SL 0·31, SI 66, PW 0·33, AL 0·73. As holotype.

Holotype worker, **Cameroun**: nr Yaounde, sample ABH (*G. Terron*) (ENSA).
Paratype. 1 worker with same data as holotype (BMNH).

Among the known species of the *weberi*-complex only 3, *kerasma*, *mekaha* and *weberi*, have the metanotal groove impressed. Of these *weberi* is recognised by the very strong impression in the posterior margin of the spongiform strip bordering the postpetiole posteriorly. This impression is so deep in *weberi* that it reaches to the margin of the postpetiolar disc, whereas in *kerasma* and *mekaha* the impression is shallow and there is always a wide expanse of spongiform material between the posterior margin of the postpetiolar disc and the deepest point of the impression. Other differences from *weberi* are tabulated under *kerasma*. *S. kerasma* and *mekaha* are separated by the form of the cephalic pilosity, which in the former consists of numerous standing hairs which are erect basally but pass through an obtuse angle near their midlengths so that their upper portions are directed forwards. In *mekaha*, on the other hand, all the cephalic hairs are strongly arched forwards from base to apex so that their apices are in contact with the surface some distance in front of their bases.

Smithistruma minkara sp. n.

(Fig. 14)

Holotype worker. TL 2·5, HL 0·73, HW 0·40, CI 55, ML 0·06, MI 8, SL 0·31, SI 78, PW 0·28, AL 0·68.

Head very long and narrow, CI range of entire type-series 54–58; CI range for all other known species of the *weberi*-group is 61–68. Mandibles (from a paratype) armed with a high truncated basal lobe which is slightly longer than any of the teeth in the principal row. Distal to the basal lamella is the principal row of 5 relatively large teeth, separated from the lamella by a small diastema. Following these are two slightly smaller teeth, 4 minute denticles and a small apical tooth. Anterior clypeal margin transverse to exceedingly shallowly convex, the lateral clypeal margins very slightly converent anteriorly and with broadly rounded anterolateral angles. Sides and dorsum of clypeus with short curved ground-pilosity and also with numerous much longer stouter curved simple hairs. The long stout simple hairs arising from the lateral clypeal margins are directed outwards from the margin but then curve upwards or forward and upwards. On the dorsum of the clypeus the hairs are shorter centrally than at the sides, directed vertically or slightly curved. In profile the dorsum of the head behind the clypeus with short fine anteriorly curved ground-pilosity which is decumbent, and with stouter longer straighter hairs which are vertical or nearly so, these hairs shorter anteriorly than posteriorly on the head. In full-face view the sides of the head with abundant long simple projecting hairs, most of which are curved or sinuate. Median portion of clypeus from anterior tumulus to frontal lobes smooth or nearly so, the rest of the clypeus irregularly punctate. Dorsum of head coarsely reticulate-punctate, with well developed rugulae between the punctures on the

vertex. Occipital concavity bounded on each side by a small flange or tooth in full-face view. Antennal scapes relatively long, narrowest at base but gradually increasing in width through the basal third, then slightly bent and broadened, the evenly curved leading edge with a series of freely projecting curved long simple hairs. Eyes of moderate size, maximum diameter 0·15×HW. Head flattened in profile, the dorsum depressed and shallowly concave between clypeus and vertex, the eye bulging slightly beyond the ventral margin of the scrobe. Dorsal surfaces of alitrunk (except propodeum), petiole, postpetiole and first gastral tergite with numerous erect irregular to flagellate fine simple hairs, shorter more reclinate forms of which also project from the dorsal (outer) surfaces of the middle and hind tibiae. Dorsum of promesonotum and sides of pronotum strongly longitudinally rugose, the rugae smooth and rounded dorsally but the spaces between them punctate to shagreened and dull. Propodeal dorsum unsculptured except for a few small punctures, the declivity smooth. Pleurae mostly smooth, with a sparse median punctulate patch; the sides of the propodeum irregularly strongly rugose. With the alitrunk in profile the metanotal groove very feebly indicated, the propodeal teeth strong and broadly triangular, without infradental lamellae. Pronotum not sharply marginate laterally and lacking a median dorsal longitudinal carina. Dorsum of petiole node strongly irregularly rugose. Dorsum of postpetiole everywhere very strongly longitudinally costate to rugose, the sculpture very regular and almost sulcate. Basigastral costulae fine and very numerous, extending back almost to the apex of the segment in the centre of the sclerite, less extensive at the sides. Spongiform appendages of pedicel segments massively developed in profile. In dorsal view the petiole node surrounded posterolaterally and posteriorly by a thick spongiform strip. Disc of postpetiole in dorsal view completely surrounded by thick spongiform tissue which is broadest posterolaterally. Base of first gastral tergite with a thick spongiform transverse band which is overlapped by that on the posterior margin of the postpetiole. Colour medium brown.

PARATYPE WORKERS. TL 2·4–2·6, HL 0·70–0·76, HW 0·40–0·44, CI 54–58, ML 0·06–0·08, MI 8–11, SL 0·30–0·33, SI 73–78, PW 0·28–0·29, AL 0·67–0·74 (14 measured).

As holotype but maximum diameter of eye 0·15–0·18×HW. In some the pleural punctate area is somewhat more extensive than in others and frequently the mesonotum is rather more swollen in profile than is the case in the holotype. One or two vestigial rugulae may be present on the propodeal dorsum, especially towards the sides. The basigastral costulae may cover only about half of the first gastral tergite on the centre of the sclerite.

Holotype worker, **Ivory Coast**: Monogaga, 24.x.1980 (*V. Mahnert & J.-L. Perret*) (MHN).

Paratypes. **Ivory Coast**: 11 workers with same data as holotype; 21 workers and 3 females, Tai Forest, 17.x.1980 (*V. Mahnert & J.-L. Perret*); 1 worker, Sassandra, 10 km from Monogaga, 16.iii.1977 (*I. Löbl*); 1 worker, Abidjan, Banco Forest, ii.1963 (*W. L. Brown*) (MHN; BMNH; MCZ; ENSA).

Of the three known species of this group which have the postpetiolar disc sculptured, *minkara* is immediately identifiable by its very long narrow head and relatively long scapes.

Smithistruma nykara sp. n.

HOLOTYPE WORKER. TL 2·4, HL 0·66, HW 0·43, CI 65, ML 0·07, MI 12, SL 0·31, SI 72, PW 0·29, AL 0·63.

Basal lamella of mandible not visible, what can be seen of dentition as described for *enkara*. Anterior clypeal margin transverse, the lateral margins very shallowly convex and feebly convergent anteriorly. Clypeus laterally and dorsally with fine short simple ground-pilosity which is mostly anteriorly curved and quite closely applied to the surface, and also with conspicuous much longer simple stouter hairs which are blunt apically. In profile these long hairs arise almost vertically from the clypeal dorsum, are shorter anteriorly and longest posteriorly where they form a transverse row of 4. In full-face view the long hairs project laterally or anterolaterally from the margins and are upcurved in the apical half to one-third of their length. Sides of head with numerous projecting fine simple hairs which are feebly flagellate, arched or looped. Dorsum of head behind clypeus with short anteriorly curved ground-pilosity such as is seen on the clypeus but towards the vertex and from the vertex to the occipital margin with fine simple hairs which are short flagellate, arched or looped. Long stout hairs such as those described on the clypeus are absent from the cephalic dorsum proper. Dorsum of head reticulate-rugulose, the clypeus less regularly rugulose. Antennal scapes feebly bent at about the basal third, broadest just distal to this. Leading edge of scape with a series of simple long projecting curved hairs. Maximum diameter of eye 0·14×HW. Pronotum not marginate laterally, without a median longitudinal ridge or carina dorsally. In profile the metanotal groove not impressed, the propodeal teeth broad basally but narrowly triangular at apex, and with a narrow but distinct infradental lamella. Dorsal surfaces of pronotum, mesonotum, petiole, postpetiole and gaster with numerous fine simple hairs which are mostly short flagellate but some of which are curved or looped

apically. Dorsal (outer) surfaces of middle and hind tibiae with numerous simple projecting hairs, many of which are curved or subflagellate. Sides of pronotum reticulate-rugose, pleurae densely punctate. Dorsal alitrunk everywhere finely but strongly reticulate-rugose, the spaces between the rugae not punctate except posteriorly on the propodeum where they form the main sculpture between the bases of the teeth. Petiole dorsum reticulate-rugose and the anterior face with a narrow transverse crest; the disc of the postpetiole strongly longitudinally rugose. Basigastral costulae strongly developed, covering the basal third or slightly more of the tergite. With pedicel segments in profile the spongiform appendages strongly developed. In dorsal view the petiole node with a narrow posterior strip which is broadest posterolaterally and interrupted medially. Sides of postpetiole disc not bounded by spongiform tissue in dorsal view. Posterior margin of postpetiole with a spongiform strip which is broad posterolaterally but concave and much narrowed medially, and interrupted centrally. Base of first gastral tergite with a transverse strip which is mostly laminar and is traversed by the basal costulae. Colour medium brown.

Paratype workers. TL 2·4–2·6, HL 0·65–0·70, HW 0·44–0·47, CI 66–68, ML 0·07, MI 10–12, SL 0·31–0·34, SI 71–73, PW 0·28–0·32, AL 0·62–0·70 (4 measured).
As holotype, the maximum diameter of the eye 0·14–0·16×HW.

Holotype worker, **Zimbabwe**: Umtali, Melsetter, 1700 m, ii.1969 (*R. Mussard*) (MHN).
Paratypes. 4 workers with same data as holotype (MHN; BMNH; MCZ).

Related to *enkara* and *minkara* by its possession of a sculptured postpetiolar disc, *nykara* is separated from the latter by its shorter broader head, punctate pleurae and different cephalic pilosity. From the former *nykara* is differentiated by the characters given in the key and noted under *enkara*.

Smithistruma placora sp. n.

Holotype worker. TL 2·1, HL 0·58, HW 0·39, CI 67, ML 0·04, MI 7, SL 0·28, SI 72, PW 0·27, AL 0·58.
Dentition of mandible (from a paratype) as described for *malaplax*. With the head in full-face view the anterior clypeal margin very shallowly concave. Sides of clypeus irregular and feebly convex, somewhat convergent anteriorly and with rounded anterolateral angles. Lateral margins of clypeus in full-face view with numerous projecting hairs; a lower series of more slender hairs present which are curved anteriorly and are densest on the posterior halves of the margins, the more anteriorly placed members of this series of slender hairs may be upcurved apically. Above these finer hairs is a series of much longer stouter cylindrical hairs which project anterolaterally, are curved upwards or upwards and backward in the apical half to one-third of their length, and which are feebly clavate apically. The anterior clypeal margin with a few pairs of weakly clavate very short hairs which are directed towards the midline. Sides of head in full-face view irregular, with projecting long hairs which are stoutest and most rigid anteriorly on the upper scrobe margins but which become finer and more flexuous posteriorly on the sides and are weakly flagellate on the posterior curves of the occipital lobes. With the head in profile the clypeal dorsum with a shallow median concavity which lacks hairs. In front of this the anterior clypeal convexity is equipped with numerous short stout weakly clavate hairs which are directed anterodorsally from their bases but which are then curved so that their apieces point vertically or even posteriorly; the more anteriorly situated members of this group of hairs are shorter than those nearest the median concavity. Behind the median clypeal concavity is a single transverse row of longer sinuate weakly clavate hairs whose apices tend to point weakly forwards. Behind these, at the level of the frontal lobes are similarly constructed but shorter hairs, about half the length of the posterior clypeal row or slightly more. Dorsum of head behind clypeus with fine simple short ground-pilosity which is closely applied to the surface and strongly curved anteriorly, and with numerous very long specialized hairs which are arranged roughly in arched-transverse rows. The anteriormost specialized row contains the stoutest most rigid hairs, which are slightly curved anteriorly and at least twice longer than the longest hairs on the clypeal dorsum. The more posterior rows are no shorter but become progressively finer and more flexuous; those behind the vertex are feebly flagellate. Scape weakly bent at its basal third and broadest just distal to this, the leading edge and dorsal surface with curved simple projecting hairs. Maximum diameter of eye 0·15×HW. Dorsum of head densely reticulate-rugose. Pronotum not marginate laterally, without a median longitudinal ridge or carina. Alitrunk in profile lacking a metanotal groove or impression. Propodeal teeth narrowly triangular and subtended by a narrow evenly concave infradental lamella. Sides of pronotum and propodeum irregularly rugulose, the pleurae punctate. Promesonotal dorsum longitudinally rugose with weakly punctulate interspaces. Propodeal dorsum densely punctate with only vestiges of fine rugulae, the declivity smooth. Dorsum of petiole node irregularly rugose, the postpetiolar disc smooth and shining. First gastral tergite with dense conspicuous basal costulae. Dorsal

surfaces of pronotum, mesonotum, petiole, postpetiole and gaster with numerous long fine flagellate hairs. Spongiform appendages of pedicel segments massively developed in profile. In dorsal view the petiole node with a broad posterior spongiform strip which is concave posteromedially. Postpetiole disc completely surrounded by spongiform material, the margin of the posterior spongiform strip sharply indented medially. Spongiform band traversing base of first gastral tergite thick and ruff-like. Colour medium brown, the gaster blackish brown.

PARATYPE WORKERS. TL 2·0–2·1, HL 0·56–0·60, HW 0·36–0·38, CI 63–66, ML 0·04–0·05, MI 7–9, SL 0·24–0·28, SI 68–74, PW 0·24–0·27, AL 0·52–0·58 (3 measured).

As holotype but maximum diameter of eye 0·14–0·16×HW.

Holotype worker, **Cameroun**: Nkoemvon, 2.xi.1980, N49 (*D. Jackson*) (BMNH).

Paratypes. **Cameroun**: 2 workers with same data as holotype but 2.iii.1980; 1 worker with same data but 12.x.1980, N45 (BMNH; MCZ; MHN).

Among the species of the *weberi*-complex of this group, as characterized by their unsculptured postpetiolar discs, *placora* is isolated by its remarkable cephalic pilosity and lack of an impressed metanotal groove. The closest relatives of *placora, fenkara, tolomyla* and *synkara*, are discussed under the last name.

Smithistruma synkara sp. n.

HOLOTYPE WORKER. TL 2·7, HL 0·76, HW 0·50, CI 66, ML 0·07, MI 9, SL 0·34, SI 68, PW 0·34, AL 0·74.

Dentition of mandible not clearly visible but apparently as described for *malaplax*. Anterior clypeal margin transverse to feebly sinuate. Sides of clypeus irregular, slightly convergent anteriorly and with rounded anterolateral angles. In full-face view the posterior halves of the sides of the clypeus with a few simple projecting anteriorly curved fine hairs which are acute apically. Above and forward of these fine hairs are a number of much longer stouter cylindrical hairs which are blunt apically and which project anterolaterally, being sharply upcurved in the apical half to one-third of their length. Anterior clypeal margin with a few much shorter straight hairs which project forward over the mandibles. Sides of head behind clypeus irregular and with numerous projecting fine hairs, the posteriormost of which are weakly flagellate. In profile the clypeal and cephalic dorsa with short fine ground-pilosity which is curved anteriorly and closely applied to the surface, and with long specialized hairs which are stout and simple and pointed to blunt apically, but not clavate. On the anterior portion of the clypeus the specialized hairs are relatively short and curve forwards and upwards. Behind them is a shallowly concave area of the clypeus which lacks hairs and behind this is a transverse row of long erect feebly sinuate hairs which are two or more times longer than those on the anterior part of the clypeal dorsum. From this level to the vertex all the specialized long hairs are stout and simple, acute apically and slightly curved forward, all about the same length, roughly equal to the longest hairs on the clypeal dorsum except for those which are adjacent to the frontal lobes, which are slightly shorter. Behind the vertex the hairs shorter and more strongly curved, those closest to the occipital margin finer and weakly flagellate. Entire dorsum of head strongly reticulate-rugulose. Scapes weakly bent at about the basal third, broadest distal to this and the leading edge and dorsal surface with long projecting cylindrical curved hairs. Maximum diameter of eye 0·16×HW. Pronotum not marginate laterally, lacking a median longitudinal ridge or carina dorsally. In profile the alitrunk lacking a metanotal groove or impression, with narrow sharply triangular propodeal teeth subtended by a slender infradental lamella whose free posterior margin is concave. Sides of pronotum and propodeum irregularly rugose, the pleurae punctate. Pronotal dorsum longitudinally rugose with a few cross-meshes; mesonotal dorsum strongly reticulate-rugose. Propodeal dorsum predominantly punctate, with faint rugular vestiges. Dorsum of petiole node strongly rugose, the postpetiolar disc smooth and shining. First gastral tergite smooth and shining except for the dense sharply defined basal costulae. Dorsal surfaces of pronotum, mesonotum, petiole, postpetiole and gaster with fine dense hairs which are arched, looped or flagellate. Spongiform appendages of pedicel segments strongly developed in profile. In dorsal view the petiole node with a thick posterior spongiform strip which is narrowest medially. Disc of postpetiole completely surrounded by thick spongiform material, the posterior band deeply indented medially. Base of first gastral tergite with a thick ruff-like transverse spongiform band. Colour dark brown, the gaster blackish brown.

PARATYPE WORKER. TL 2·8, HL 0·76, HW 0·50, CI 66, ML 0·07, MI 9, SL 0·34, SI 68, PW 0·34, AL 0·72 As holotype.

Holotype worker, **Gabon**: Makokou, x.1972, rain forest (*I. Lieberburg*) (MCZ).

Paratype. 1 worker with same data as holotype (BMNH).

Within the *weberi*-complex four species, *fenkara, placora, tolomyla* and *synkara* form a close association by their mutual lack of postpetiolar sculpture, lack of a metanotal impression and possession of long specialized hairs on the cephalic dorsum which are similar to those on the clypeal dorsum. In *fenkara, tolomyla* and *synkara* these specialized cephalic hairs tend to be about equal in size and shape and equal to the longest hairs on the clypeal dorsum, whereas in *placora* the size and shape of the specialized hairs are very variable, and those on the cephalic dorsum tend to be very much longer than any found on the clypeus. *S. fenkara* is a smaller more lightly coloured species than *synkara* and has the long cephalic hairs conspicuously clavate (simple in *synkara*). Finally *tolomyla*, a smaller species, has a deep median indentation in the spongiform strip bordering the posterior margin of the postpetiole and has the anterior clypeal margin shallowly but evenly concave.

Smithistruma tolomyla **sp. n.**

HOLOTYPE WORKER. TL 2·1, HL 0·58, HW 0·39, CI 67, ML 0·06, MI 10, SL 0·27, SI 69, PW 0·27, AL 0·60.

Dentition (from paratype) of a high basal lamella followed by a small diastema, 5 relatively large teeth forming the principal row, two slightly smaller teeth, 4 minute denticles and a small apical tooth. Anterior clypeal margin evenly shallowly concave, the anterolateral angles rounded and the sides very feebly divergent posteriorly. Lateral margins of clypeus with projecting simple hairs, the shorter hairs curved anteriorly, the longer hairs projecting outwards and upcurved in their apical halves. Sides of head with numerous long fine projecting hairs. In profile the clypeal dorsum with a few upcurved hairs anteriorly and a transverse row of much longer erect sinuate hairs across the posterior clypeal margin. Ground-pilosity of cephalic dorsum behind clypeus of short fine anteriorly arched hairs whose apices are in contact or nearly in contact with the surface. Specialized pilosity of erect curved to sinuate hairs similar to those on the posterior clypeus are present on the cephalic dorsum, the longest of them no longer than those on the posterior clypeus or only very slightly longer. Scape slightly bent in basal third, the leading edge with a series of freely projecting simple hairs which are upcurved apically. Cephalic dorsum densely and coarsely reticulate-rugose, the clypeus more finely sculptured. Pronotum not marginate laterally, without a median longitudinal carina dorsally. Metanotal groove absent. Propodeal teeth fine and narrow, the infradental lamella reduced to a mere carina which follows the concavity of the declivity. Sides of pronotum and propodeum reticulate-rugose, the mesopleuron with scattered small sharply incised punctures on a smooth surface, the metapleuron mostly smooth. Promesonotal dorsum coarsely rugose, the propodeal dorsum densely punctate. Spongiform appendages of pedicel segments well developed in profile. Ventral appendage of petiole with a broad indentation in its ventral margin at about the midlength. Ventral lobe of postpetiole massive. Petiole node rugulose in dorsal view, the posterior spongiform strip narrow medially, its thickness distinctly much less than the dorsal length of the node. Postpetiole in dorsal view smooth and shining, surrounded on all sides by spongiform material. Anteriorly the postpetiole with a relatively narrow transverse spongiform strip, laterally the spongiform material increasing thickness posteriorly, the tissue thickest at the posterolateral angles. Margin of posterior spongiform appendage of postpetiole indented medially, the indentation reaching the posterior margin of the disc. Base of first gastral tergite with a dense spongiform strip, the tergite behind this level with short basigastral costulae present. Dorsal surfaces of alitrunk, petiole, postpetiole and gaster with numerous simple fine hairs. Colour brown.

PARATYPE WORKER. TL 2·1, HL 0·58, HW 0·38, CI 66, ML 0·05, MI 9, SL 0·26, SI 68, PW 0·26, AL 0·58. As holotype.

Holotype worker, **Cameroun**: nr Yaounde, sample K2 (*G. Terron*) (ENSA).

Paratype. 1 worker, **Cameroun**: nr Yaounde, sample FF (*G. Terron*) (BMNH).

In the *weberi*-group six species are known in which the postpetiolar disc is without costulate sculpture and the metanotal groove is not impressed. These two characters are combined in *arahana, fenkara, malaplax, placora, synkara* and *tolomyla*. The first named is easily distinguished from the rest as it has the spongiform trip which borders the petiole node posteriorly very thick indeed, thicker than the dorsal length of the node. In the remainder this strip is quite narrow, not even approaching the length of the node. Two other species which are quickly differentiated from *tolomyla*; *malaplax*, which lacks specialized long hairs on the cephalic dorsum similar to those on the clypeal dorsum, and *placora*, in which such specialized hairs are present but very much longer on the cephalic dorsum than on the clypeus. The remaining species, *fenkara, synkara* and *tolomyla*, form a close triad. *S. fenkara* is characterized by the

conspicuously swollen nature of the specialized cephalic hairs and *synkara* is differentiated from *tolomyla* by the characters mentioned in the key and the shape of the anterior clypeal margin, which is concave in the latter species.

Smithistruma weberi Brown

Smithistruma weberi Brown, 1959*c*: 7, fig. 4. Holotype worker, ZAIRE: Ango, ii.–iii.1948, no 2170 (*N. A. Weber*) (MCZ) [examined].

WORKER. TL 2·3, HL 0·61, HW 0·39, CI 64, ML 0·07, MI 11, SL 0·28, SI 72, PW 0·28, AL 0·58.

Basal lamella of mandible a high truncated rectangle with concave sides. Basalmost tooth on mandible small, separated from the basal lamella by a small diastema. Second tooth from base the longest, the third about twice longer than the basalmost. The three teeth of the principal row following the second (longest) tooth are about the same size and are followed distally by 2 smaller teeth, 4 minute denticles and a small apical tooth. Anterior clypeal margin more or less transverse, only very feebly sinuate. Lateral clypeal margins irregular, feebly convergent anteriorly and with rounded anterolateral corners. With the head in full-face view the lateral clypeal margins with a few anteriorly curved simple short hairs and with a number of anterolaterally or laterally projecting stout long hairs which are upcurved in their apical halves and feebly clavate apically. Such hairs also present on clypeal dorsum where they curve posteromedially, and on the sides of the head where they curve upwards and forwards. Dorsum of head behind clypeus with small simple anteriorly curved hairs which are closely applied to the surface and with longer stout hairs similar in shape and size to those on the clypeus, the longer subclavate hairs feebly curved anteriorly or anteromedially. Cephalic dorsum strongly densely reticulate-rugulose. Antennal scape weakly bent in its basal third, broadest at about the midlength and having the leading edge equipped with freely projecting curved hairs which also occur on its dorsal surface. Maximum diameter of eye 0·18×HW. Pronotum not marginate laterally and without a median longitudinal ridge or carina dorsally. With the alitrunk in profile the metanotal groove distinctly impressed. Propodeal teeth very small and triangular, subtended by a conspicuous infradental lamella whose free posterior margin is almost straight, not evenly concave as is usual in this group. Dorsal surfaces of pronotum, mesonotum, petiole, postpetiole and gaster with numerous simple fine hairs which may be subflagellate, looped or arched, without large subclavate hairs similar to those on the head. Sides of pronotum and propodeum rugulose, the mesopleuron finely punctate and the metapleuron almost smooth. Dorsum of pronotum and mesonotum densely reticulate-rugulose, the propodeal dorsum densely punctate and the declivity smooth. Petiole dorsum irregularly rugulose; postpetiolar disc smooth. First gastral tergite with sharply defined but short basal costulae. Spongiform appendages of pedicel segments strongly developed in profile. In dorsal view the petiole node with a broad posterior spongiform strip whose free margin is shallowly concave medially. Disc of postpetiole surrounded by spongiform material, the strip bordering the posterior margin broadest posterolaterally, narrowing medially and sharply indented at the midpoint, the indentation reaching the margin of the disc itself. Base of first gastral tergite with a broad band of spongiform material from which the basigastral costulae emerge. Colour medium brown.

Known only from the holotype *weberi* is one of three species in the group which combine an unsculptured postpetiolar disc and an impressed metanotal groove. The other species showing these two characters together are *kerasma* and *mekaha*; details for separating these two from *weberi* are tabulated under *kerasma*.

MATERIAL EXAMINED

Zaire: Ango (*N. A. Weber*).

The *marginata*-group

(Fig. 17)

Antennae with 4 or 6 segments. Basal lamella of mandible a long low lobe followed by a principal dental row of 7 teeth, without a diastema. Anterior clypeal margin broadly and shallowly convex in full-face view and the sides of the clypeus roughly parallel, not convergent anteriorly throughout their length. Lateral and anterior margins of clypeus, and clypeal dorsum, lacking hairs of any description. Body hairs sparse, fine and simple. Long flagellate hairs present on dorsal margins of the antennal scrobes and on the pronotal humeri. Leading edges of scapes without projecting hairs, any hairs which do occur here are minute and decumbent to appressed. Pronotum not marginate laterally in *rusta* but sharply marginate in *marginata*, both with a median longitudinal carina on the pronotal dorsum. Infradental lamellae on propodeum broad.

Of the two species recognized in this small group *rusta*, known only from Zimbabwe, has 6 antennal segments and lacks lateral pronotal margination, whilst the more widely distributed *marginata*, from Ivory Coast, Kenya and Zimbabwe, has only 4 antennal segments and possesses strong lateral pronotal margination. Despite these marked differences I regard both species as belonging in the same group as they have the same very characteristic clypeal structure, head shape, body pilosity and distribution of flagellate hairs.

S. marginata was previously included in the now disbanded genus *Miccostruma*, as discussed in the introduction to the genus.

Smithistruma marginata (Santschi) **comb. n.**

Epitritus marginatus Santschi, 1914*a*: 114, fig. 21. Syntype workers, KENYA: Shimoni, st. no. 9, xi.1911 (*Ch. Alluaud & R. Jeannel*) (NMB) [examined].
Miccostruma marginata (Santschi) Brown, 1948: 123.

WORKER. TL 1·2–1·3, HL 0·40–0·43, HW 0·26–0·28, CI 64–68, ML 0·04, MI 8–10, SL 0·17–0·18, SI 64–67, PW 0·16–0·18, AL 0·37–0·39 (10 measured).

Mandible with a low basal lamella, not a high triangle or high rectangle with concave sides, the lamella not or just visible when the mandibles are closed. No diastema between basal lamella of mandible and basalmost tooth. Principal dental row consisting of 7 teeth, followed by 4 minute denticles and a small apical tooth. In full-face view the outer margins of the fully closed mandibles diverging posteriorly but intersecting the shallowly convex anterior margin of the clypeus well in from the rounded anterolateral angles; the outer margins of the mandibles and the lateral clypeal margins not forming a more or less continuous line. Clypeus absolutely devoid of hairs, without fringing pilosity and lacking dorsal pilosity. Lateral margins of clypeus straight and parallel, rounding anteriorly into the shallowly convex anterior margin, continuous posteriorly with the parallel preocular laminae. Disc of clypeus without a tumulus, with scattered minute pubescence visible under high magnification and with its posteriormost portion slightly raised into a low blunt prominence between the frontal lobes. Upper scrobe margins in full-face view evenly curved-divergent behind the frontal lobes, with a maximum of three laterally projecting flagellate hairs on each side, though these seem to be lost easily by abrasion. Dorsum of head with very fine sparse simple curved short ground-pilosity and with two pairs of long curved to flagellate hairs. Dorsum of clypeus finely shagreened or granular, dorsum of head finely reticulate-punctate. Antennae with 4 segments, the scapes curved in the basal third, not dorsoventrally flattened beyond the curve; their leading edges with fine apically curved simple hairs which are decumbent to appressed. Eyes small, their maximum diameter only about 0·07×HW and distinctly less than the maximum width of the scape. Pronotum sharply marginate anteriorly and laterally and with a strong mid-dorsal longitudinal ridge or carina which may be doubled for part or most of its length. Mesonotum laterally less strongly marginate than pronotum but propodeum sharply marginate to the base of the teeth. Mesonotal dorsum usually with a continuation of the pronotal median carina but this may be poorly developed or faint in some individuals. The dorsal alitrunk with a transverse crest or slightly raised step between the mesonotum and propodeum. Dorsal alitrunk with scattered sparse ground-pilosity which is short fine and decumbent, and with three pairs of flagellate hairs distributed as follows. First pair on pronotal humeri, directed dorsolaterally; second pair at approximate midlength of lateral pronotal margination, directed dorsally; third pair on mesonotal margin posteriorly, close to the transverse crest, directed dorsally. Propodeal teeth laminar and continuous with the broad infradental lamellae which run the length of the declivity on each side. Sides of alitrunk unsculptured. Pronotal dorsum mostly smooth but in some with the faintest vestiges of patchy superficial sculpture. Mesonotum posteriorly with faint vestiges of reticular sculpture; propodeum smooth. Spongiform appendages of petiole and postpetiole strongly developed and very voluminous in profile, but in dorsal view only the posterior margin of each segment bounded by spongiform tissue and on the postpetiole the transverse spongiform material is interrupted posteromedially. Disc of postpetiole unsculptured, its posterior margin slightly indented medially. Both pedicel segments with fine curved hairs, some of which are long and subflagellate. First gastral tergite with 5 or 6 basigastral costulae on each side of the midline, otherwise the gaster unsculptured. Gastral pilosity simple and sparse, consisting of scattered fine short hairs which are decumbent to appressed and even sparser suberect to erect fine hairs which are longer. Legs with appressed pubescence only, without standing hairs. Colour uniform dull yellow to yellowish brown.

One of the few *Smithistruma* species to have 4-segmented antennae, *marginata* is separated from all others with this antennomere count by the shape of its clypeus and lack of clypeal pilosity, by

its strongly marginate pronotum and possession of a median longitudinal ridge or carina on the pronotal dorsum.

MATERIAL EXAMINED

Ivory Coast: Man (*V. Mahnert & J.-L. Perret*); Adiopodoume (*V. Mahnert & J.-L. Perret*). **Kenya**: Shimoni (*Ch. Alluaud & R. Jeannel*); Lamu, nr Witu (*V. Mahnert & J.-L. Perret*). **Zimbabwe**: Umtali, Melsetter (*R. Mussard*).

Smithistruma rusta sp. n.

(Fig. 17)

HOLOTYPE WORKER. TL 2·0, HL 0·55, HW 0·37, CI 67, ML 0·07, MI 13, SL 0·27, SI 73, PW 0·24, AL 0·52.

Mandible with a principal dental row of 7 teeth of approximately the same size, followed distally by 4 minute denticles and a small apical tooth. Basal lamella of mandible concealed by clypeus. Anterior clypeal margin evenly broadly shallowly convex, the lateral margins more or less straight and parallel, not evenly convergent anteriorly throughout their length. Outer margins of closed mandibles in full-face view intersecting the anterior clypeal margin some distance in from the anterolateral angles, the outer mandibular margins and lateral clypeal margins not forming a more or less continuous line. Anterior and lateral clypeal margins without projecting hairs of any description, dorsum of clypeus without hairs. Dorsum of head behind clypeus with scattered simple fine hairs which are arched and decumbent, or appressed. Sides of head with long flagellate hairs present. Each member of the type-series has lost some flagellate hairs, which seem easily displaced by abrasion; the maximum number of flagellate cephalic hairs appears to be as follows. One pair posterolaterally on the occipital lobes which may be directed upwards or outwards; one pair directed laterally from the posteriormost point of the upper scrobe margins; one pair arising from the side of the head just above the last-mentioned pair and tending to be directed upwards rather than outwards; one pair more anteriorly situated on the upper scrobe margin, about on a level with the anterior margin of the eye. Preocular laminae in full-face view more or less parallel. Antennae with 6 segments, the scape narrow and not strongly flattened, bent approximately at its basal third. Leading edge of scape lacking a series of anteriorly projecting hairs, only with short decumbent to appressed fine pubescence. Maximum diameter of eye 0·11×HW. Dorsum of clypeus closely punctulate, cephalic dorsum strongly reticulate-punctate everywhere except for a narrowly triangular smooth area running back from the posterior clypeal margin between the frontal lobes. Anterior border of pronotum sharply transversely marginate, the sides of the pronotum not marginate. Pronotal and mesonotal dorsa with a median longitudinal ridge or carina. Posterior half of mesonotum and all of propodeum narrowly marginate laterally. With alitrunk in profile the lateral mesonotal-propodeal margination continuous, without trace of a metanotal groove; however, mid-dorsally the median mesonotal ridge or carina ends at a distinct step-down at its junction with the propodeum. Propodeal teeth broadly triangular and with a conspicuous infradental lamella. Pronotal humeri each with a long fine flagellate hair. Dorsal alitrunk with 2–3 pairs of long fine curved hairs which are simple and erect, and with several pairs of decumbent to appressed fine simple short hairs. Dorsal surfaces of petiole and postpetiole with sparse but conspicuous erect to suberect fine hairs. Sides of alitrunk smooth and shining, with marginal feeble sculpture dorsal to and posterior to the extensive smooth area. Pronotal dorsum with 2–3 feeble longitudinal costulae on each side of the median ridge or carina, the spaces between the costulae filled with broad shallow superficial punctures. Mesonotum, propodeal dorsum, propodeal declivity between the teeth and petiole node densely punctate. Disc of postpetiole glassy smooth. First gastral tergite unsculptured except for the sparse widely spaced basigastral costulae. Spongiform appendages of pedicel segments strongly developed in profile. Petiole node in dorsal view with a narrow posterior lamina. Postpetiole in dorsal view with a narrow lamina on the anterior margin and with the lateral spongiform material visible projecting beyond the lateral margins of the disc. Posterior margin of postpetiole with a laminar rather than spongiform transverse strip; broadest laterally and narrowing medially where the posterior margin of the postpetiolar disc itself is indented. Base of first gastral tergite with a narrow laminar strip which is traversed by the sparse basigastral costulae. Colour glossy light brown.

PARATYPE WORKERS. TL 2·0–2·1, HL 0·54–0·58, HW 0·36–0·38, CI 63–69, ML 0·07–0·08. MI 12–14, SL 0·26–0·28, SI 70–78, PW 0·24–0·26, AL 0·52–0·56 (10 measured). As holotype.

Holotype worker, **Zimbabwe**: Umtali, Melsetter, 1700 m, ii.1969 (*R. Mussard*) (MHN).
Paratypes. 10 workers with same data as holotype (MHN; BMNH; MCZ; ENSA).

Related to *marginata* by the characters discussed in the species-group diagnosis, *rusta* is quickly

separated from all other Afrotropical *Smithistruma* presently known by its combination of these characters with 6-segmented antennae.

The *oxysma*-group
(Figs 18, 19)

Antennae with 6 segments. Basal lamella of mandible a low lobe, principle dental row of 7 teeth; no diastema between the basal lamella and the basalmost tooth. Sculpture of head and body fine. Anterior clypeal margin prominent and narrowly rounded in full-face view, the sides more or less evenly convergent anteriorly and forming an approximately continuous line with the outer margins of the closed mandibles. Sides of clypeus without a fringing row of spatulate or spoon-shaped anteriorly curved hairs. Dorsum of clypeus with weakly clavate hairs which are curved posteriorly or posteromedially, the anteriormost one or two pairs of these being visible in full-face view as they project beyond the clypeal margin, close to the point where the clypeus overlaps the mandibles, and curve outwards and backwards. Body pilosity sparse, fine and simple. Long flagellate hairs present on pronotal humeri, present or absent on upper scrobe margins. Leading edges of antennal scapes without projecting hairs, any hairs which do occur here are short and decumbent to appressed. Pronotum not marginate laterally but with a median dorsal longitudinal carina present. Propodeal infradental lamellae broad and well developed.

The two species of this small group, *anarta* and *oxysma*, are presently known only from South Africa. They are characterized primarily by the form and pilosity of the clypeus, characters not shared with any other Afrotropical species, although the shape is duplicated in the *tacta*-group. In this last-named group, however, the clypeal pilosity is radically different and the antennae have only 4 segments.

The closest relatives of the *oxysma*-group appear to belong to the New World *ornata*-group, which contains three species showing the clypeal shape and pilosity noted above (Brown, 1953*a*: 64), but in *ornata* and its relatives the mandibles have a long diastema between the basal lamella and the basalmost tooth, a character not observed in the *oxysma*-group. At present I am uncertain how important this character is, so I feel it is best to keep the New World and Afrotropical species in separate groups until it can be investigated in more detail.

Smithistruma anarta sp. n.
(Fig. 18)

Holotype worker. TL 1·9, HL 0·54, HW 0·34, CI 63, ML 0·06, MI 11, SL 0·27, SI 79, PW 0·21, AL 0·48.

Principal dental row of mandible with 7 teeth, followed by 4 minute denticles and a small apical tooth. Basal lamella of mandible (concealed by clypeus in holotype) a long low rounded lobe which is only as high as the basalmost tooth; no diastema between basal lamella and basalmost tooth. In full-face view the clypeus with shallowly convex sides which are evenly convergent anteriorly and with a strongly convex anterior margin which is narrowly rounded medially; the anterior margin on each side of the midpoint forms a single evenly convex line which is continuous with the lateral margins, without trace of an anterolateral angle. Outer margins of the fully closed mandibles forming a more or less continuous line with the outer margins of the clypeus in full-face view. Clypeal margins without a fringe of anteriorly or medially curved large spatulate hairs but one or two simple short hairs may occur posterolaterally. The dorsum of the clypeus along the anterior margin with 3 pairs of short recurved spatulate hairs which curve upwards and backwards from the clypeal edge. Behind this anterior row the clypeal dorsum with 12 similar curved hairs. These 12 make up four pairs which are situated on each side of the midline and which curve backwards and towards the midline, the posteriormost pair being at the posteromedian clypeal apex; a pair on the posterior clypeal margin immediately in front of the anteriormost part of the frontal lobes, curved in the direction of the clypeal margin; and a pair situated posterolaterally on the clypeus, curved towards the midline and slightly backwards. Cephalic dorsum behind clypeus with subdecumbent to decumbent short narrowly spatulate hairs which are curved towards the highest point of the vertex. Flagellate hairs absent from dorsum of head and from upper scrobe margins. Antennal scapes slender, not flattened, narrowed basally and bent at about the basal quarter. Leading edges of scapes without a freely projecting row of long hairs, only with short fine pubescence which is decumbent to appressed. Maximum diameter of eye 0·12×HW. Clypeus finely punctulate, cephalic dorsum reticulate-punctate. Anterior pronotal border sharply transversely marginate. Sides of pronotum not marginate but sides of mesonotum and propodeum angulate. Pronotum with a median longitudinal ridge or carina dorsally. Metanotal groove visible on the

dorsal alitrunk but not impressed in profile. Propodeal teeth short and confluent with the broad infradental lamellae. Pronotal humeri each with a long flagellate hair. Posterodorsally on the mesonotum is a pair of somewhat flattened hairs which are markedly curved towards the midline and are notched apically. Dorsal ground-pilosity of alitrunk consists of a very few decumbent to appressed scattered short hairs, most easily visible on the anterior half of the pronotum. Dorsal surfaces of petiole and postpetiole with numerous back-curved hairs. First gastral tergite with 4 standing hairs only, which are blunted or notched apically and arranged in a transverse row close to the base of the sclerite. Behind this are sparse flattened short appressed hairs on the remainder of the tergite which are directed towards the midline. Sides of alitrunk unsculptured. Dorsal alitrunk unsculptured apart from the median carina and some extremely faint, almost effaced, sculptural vestiges on the promesonotum. Dorsum of petiole node densely punctate, postpetiolar disc glassy smooth. First gastral tergite unsculptured except for the sparse basal costulae which are arranged on each side of a central clear area. Spongifirm appendages of pedicel segments strongly developed in profile. In dorsal view the petiole node bounded posteriorly by a narrow lamellar strip. Shallowly concave anterior margin of postpetiole with a narrow lamellar strip. Ventrolateral spongiform appendages of postpetiole not visible in dorsal view. Posterior margin of postpetiole with a lamellar strip and the margin of the disc indented medially. Basal border of first gastral tergite with a sinuate lamella whose free margin is concave medially and convex towards the sides. Colour dull glossy yellow.

PARATYPE WORKER. TL 1·9, HL 0·55, HW 0·36, CI 65, ML 0·06, MI 11, SL 0·28, SI 78, PW 0·22, AL 0·50. As holotype.

Holotype worker, **South Africa**: Natal, Dukuduku Forest Res., 12–15 km E. of Mtubatuba, coast vine forest on sand, 26.1.1977 (*W. L. & D. W. Brown*) (MCZ).

Paratype. 1 worker with same data as holotype (BMNH).

To the present only two species of this group are known. They are separated easily as in *anarta* the clypeal dorsum has 18 recurved hairs, the upper scrobe margins lack flagellate hairs, the cephalic dorsum lacks flagellate hairs, and the first gastral tergite has only 4 standing hairs arranged in a transverse row close to the base of the sclerite. In contrast *oxysma* has 12 recurved hairs on the clypeal dorsum, has 3 pairs of flagellate hairs on the upper scrobe margins, has flagellate hairs present on the cephalic dorsum, and has 12 or more standing hairs on the first gastral tergite which are distributed all over the sclerite.

Smithistruma oxysma sp. n.

(Fig. 19)

HOLOTYPE WORKER. TL 2·1, HL 0·58, HW 0·36, CI 62, ML 0·07, MI 12, SL 0·27, SI 75, PW 0·22, AL 0·54.

Principal dental row of mandible with 7 teeth followed by 4 minute denticles and a small apical tooth. Basal lamella of mandible (concealed by clypeus in holotype) a long low rounded lobe which is only as high as the basalmost tooth; without a diastema between the basal lamella and the basalmost tooth. In full-face view the clypeus with shallowly convex sides which are evenly convergent anteriorly and with a strongly convex anterior margin which is narrowly rounded medially; the anterior margin on each side of the midpoint forms a single evenly convex line which is continuous with the lateral margins, without trace of anterolateral angles. Outer margins of the fully closed mandibles forming a more or less continuous line with the outer margins of the clypeus in full-face view. Clypeal margins without a fringe of curved spatulate to spoon-shaped hairs but one or two simple short hairs may occur laterally. The dorsum of the clypeus along the anterior margin with three pairs of flattened, apically gradually clavate, recurved hairs. The innermost pair arises very close to the clypeal apex and curves up and back without breaking the clypeal outline. The two outer pairs curve outwards as well as upwards and back and project beyond the clypeal outline in full-face view. Dorsum of clypeus behind the anterior margin also with 6 hairs which are similar in shape to those just described, arranged in a transverse band of 4 behind the midlength which curve backwards and towards the midline, and a pair close to the posterior clypeal margin which are strongly arched towards the midline and only feebly curved backwards. Ground-pilosity of cephalic dorsum of numerous simple to very narrowly spatulate fine hairs which are subdecumbent to decumbent and generally curved towards the highest point of the vertex. Upper scrobe margins with three pairs of flagellate hairs; the posterior occipital lobes with a pair of flagellate hairs; 4 other pairs of flagellate hairs present on the dorsum of the head, making a total of 16 cephalic flagellate hairs. Antennal scapes slender and more or less cylindrical, slightly narrowed basally and very weakly bent at the basal quarter. Leading edges of scapes without strong freely projecting hairs, only with decumbent fine pubescence. Maximum

diameter of eye 0·11×HW. Clypeal dorsum very finely punctate-granular, the cephalic dorsum strongly reticulate-punctate. Anterior border of pronotum transversely marginate; sides of pronotum not marginate but sides of mesonotum and propodeum angular. A mid-dorsal longitudinal ridge or carina present on pronotum and mesonotum, absent from propodeal dorsum. With the alitrunk in profile the metanotal groove absent and the propodeal teeth confluent with the broad and conspicuous infradental lamellae. Pronotal humeri with a pair of long flagellate hairs which are directed predominantly laterally. Pronotal dorsum behind the humeri with a pair of shorter flagellate hairs and with 2–3 pairs of anteriorly situated fine decumbent shorter hairs. Mesonotal dorsum with two pairs of fine hairs. Fine simple hairs numerous on dorsal surfaces of petiole and postpetiole, and such hairs widely distributed on the first gastral tergite where 12 or more are present. Sides of alitrunk unsculptured except for a few feeble longitudinal striae close to the anterior pronotal margination. Pronotum and mesonotum dorsally with scattered weak longitudinal rugulae or costulae most of which are short, the spaces between them mostly smooth on the pronotum but on the mesonotum with vestiges of punctate sculpture also visible. Propodeal dorsum smooth, with two weak rugulae running from the apex of the median mesonotal ridge across the dorsum to the bases of the propodeal teeth. Dorsum of petiole node densely punctate; disc of postpetiole smooth and shining. First gastral tergite unsculptured except for the basigastral costulae which arise in two patches, on each side of a median clear area. Spongiform appendages of pedicel segments strongly developed in profile. In dorsal view the petiole node bounded posteriorly by a narrow lamellate strip. Postpetiole in dorsal view with the anterior margin sharply concave medially and with a short narrow transverse lamella bordering the concave section. The ventrolaterally situated spongiform appendages of the postpetiole are visible in dorsal view, projecting anterolaterally and laterally beyond the outline of the disc. Posterior margin of postpetiole bordered by a lamellate strip which is very broad posterolaterally. First gastral tergite with a sinuous basal lamellar strip which has its anterior free border convex at the sides and concave medially, and which is traversed by the basigastral costulae. Colour glossy medium brown.

Paratype workers. TL 1·9–2·1, HL 0·50–0·58, HW 0·32–0·38, CI 62–67, ML 0·06–0·08, MI 11–14, SL 0·25–0·30, SI 72–80, PW 0·21–0·26, AL 0·50–0·56 (15 measured).

Maximum diameter of eye 0·11–0·14×HW. Mostly as holotype but propodeal dorsum may be unsculptured and the mesonotum may lack any trace of punctate sculpture. The long recurved hairs on the clypeus appear to be easily lost by abrasion, especially those of the anterior row, and the long flagellate hairs of the head may be flattened to the surface by accident of preservation.

Holotype worker, **South Africa**: Natal, 75 km WSW. Estcourt, Cathedral Peaks Forest Sta., 7–31.xii.1979, Ber. 8, 17.xii.1979, podocarp forest rotted stump of *Cussonia spicata* (*S. & J. Peck*) (MCZ).

Paratypes. **South Africa**: 8 workers and 1 female with same data as holotype; 5 workers with same data but Ber. 19, 24.xii.1979, podocarp forest rotted wood, moss, fleshy and woody fungi, 1500 m; 2 workers with same data but Ber. 18, 24.xii.1979, podocarp forest rotted fruit bait 1500 m (MCZ; BMNH; MHN).

Non-paratypic material examined. **South Africa**: Natal, Pietermaritzburg (*W. L. & D. E. Brown*). **Lesotho**: Mamathes (*C. Jacot-Guillarmod*).

The only closely related species is *anarta*; details of their separation are given under that name.

The *tacta*-group
(Fig. 20)

Antennae with 4 segments, the second funicular long and obviously a fusion segment. Basal lamella of mandible a low lobe, the principal dental row of 7 teeth, without a diastema between the basal lamella and the basalmost tooth. Sculpture of head and body fine. Anterior clypeal margin prominent and narrowly rounded in full-face view, the sides more or less evenly convergent anteriorly and forming an approximately continuous line with the outer margins of the closed mandibles. Margins and dorsum of clypeus with dense fine simple short hairs, without specialized or bizarre pilosity. Body pilosity fine and simple. Long flagellate hairs present on pronotal humeri and upper scrobe margins. Leading edges of scapes without projecting stout hairs. Pronotum dorsally with a median longitudinal carina. Propodeal infradental lamellae present.

The two species in this group, *tacta* and *vodensa* from West and central Africa, may be derived from the *oxysma*-group. The clypeal structure is strikingly similar in the two groups and most other characters diagnostic at species-group level are in accord. The main differences between the groups lie in the reduced antennomere count in *tacta* and *vodensa*, and their lack of specialized strong hairs on the clypeus, which are so obvious in the *oxysma*-group.

Smithistruma tacta sp. n.

HOLOTYPE WORKER. TL 1·7, HL 0·46, HW 0·31, CI 67, ML 0·07, MI 15, SL 0·20, SI 65, PW 0·20, AL 0·46.

Principal dental row of mandible with 7 teeth followed by 4 minute denticles and a small apical tooth. Basal lamella of mandible a long low rounded lobe which is no higher than the basalmost tooth; without a diastema between basal lamella and the basalmost tooth. In full-face view the clypeus with shallowly convex sides which are evenly convergent anteriorly and with a strongly convex anterior margin which is narrowly rounded medially. The anterior margin on each side of the midpoint forms a single evenly convex line which is continuous with the lateral margins, without trace of an anterolateral angle. Outer margins of the fully closed mandibles forming a more or less continuous line with the outer margins of the clypeus in full-face view. Dorsum of clypeus densely clothed with short spatulate hairs which are curved, decumbent and directed anteriorly. Lateral and anterior clypeal margins similarly densely clothed. Dorsum of head with decumbent curved fine hairs, those in front of the vertex directed towards the midline, the remainder directed towards the highest point of the vertex. Upper scrobe margins with a number of fine curved hairs similar to those on the dorsum of the head, and also with three pairs of long laterally projecting flagellate hairs; the cephalic dorsum near the occipital margin with another pair of flagellate hairs which are directed vertically. Antennae with 4 segments; the scape slender and only very weakly curved basally, not flattened. Leading edge of scape without a freely projecting row of strong hairs, only with fine curved pubescence which is subdecumbent to decumbent. Eyes small, the maximum diameter 0·06×HW. Cephalic dorsum reticulate-punctate everywhere, clypeal dorsum more finely punctate but the sculpture partially concealed by the dense pilosity. Pronotum strongly and sharply marginate anteriorly and laterally, the pronotal dorsum with a strong median longitudinal ridge or carina which does not extend onto the mesonotum. Sides of mesonotum angular, of propodeum sharply marginate. Alitrunk in dorsal view with a transverse straight line between the mesonotum and propodeum. Pronotal humeri each with a long laterally directed flagellate hair. Vertically directed flagellate hairs present in pairs on dorsum at midlength of pronotal lateral margination and posterolaterally on mesonotum. Pilosity of dorsal alitrunk otherwise of fine simple strongly curved hairs on the pronotum and mesonotum. Fine simple hairs, some of which may be looped apically, present on dorsal surfaces of petiole, postpetiole and first gastral tergite. Sides of alitrunk unsculptured, the propodeal teeth lamelliform and continuous with the infradental lamellae. Pronotal dorsum unsculptured apart from the strong median carina. Mesonotum reticulate-punctate. Propodeal dorsum and declivity glassy smooth. Dorsum of petiole node finely punctate, postpetiole glassy smooth. First gastral tergite unsculptured except for the basigastral costulae. Spongiform appendages of pedicel segments strongly developed in profile. Petiole node in dorsal view with a broad strip of spongiform material posteriorly. Anterior margin of postpetiole with a narrow spongiform strip, the posterior margin with a much broader band of spongiform tissue which is indented medially. Base of first gastral tergite with a spongiform to lamellar strip which is concave medially. Colour yellow to yellowish brown.

PARATYPE WORKERS. TL 1·7–1·8, HL 0·42–0·46, HW 0·29–0·31, CI 65–70, ML 0·06–0·08, MI 14–17, SL 0·18–0·20, SI 61–67, PW 0·19–0·22, AL 0·44–0·48 (10 measured). As holotype.

Holotype worker, **Ivory Coast**: Droplieu, 10.x.1980 (*V. Mahnert & J.-L. Perret*) (MNH).

Paratypes. **Ivory Coast**: 2 workers with same data as holotype; 7 workers, Monogaga, 24.x.1980 (*V. Mahnert & J.-L. Perret*); 1 worker, Man, Mt Tonkoui, 900 m, 13.x.1980 (*V. Mahnert & J.-L. Perret*) (MHN; BMNH; MCZ).

Non-paratypic material examined. **Ghana**: Tafo (*B. Bolton*). **Cameroun**: Nkoemvon (*D. Jackson*); nr Yaounde (*G. Terron*). **Zaire**: Yangambi (*M. Maldague*).

Of the seven known Afrotropical species with 4-segmented antennae only two, *tacta* and *marginata*, have the pronotum sharply marginate laterally and equipped medially with a longitudinal carina. These two are separated by the shape and pilosity of the clypeus as indicated in the key, and by the characters noted in the species-group diagnoses. Characters separating *tacta* and *vodensa* are tabulated under the latter.

Smithistruma vodensa sp. n.

(Fig. 20)

HOLOTYPE WORKER. TL 3·0, HL 0·74, HW 0·38, CI 51, ML 0·09, MI 12, SL 0·44, SI 116, PW 0·30, AL 0·80.

Principal dental row of mandible with 7 teeth, followed by 4 minute denticles and a small apical tooth. Basal lamella of mandible a low rounded lobe which is not as high as the basalmost tooth. No diastema between the basal lamella and the basalmost tooth. In full-face view the clypeus with shallowly convex sides

which are evenly convergent anteriorly and with a strongly convex anterior margin which is narrowly rounded medially. The anterior clypeal margin on each side of the midpoint forms a single evenly convex line which is continuous with the lateral margins, without trace of anterolateral angles. Outer margins of the fully closed mandibles forming a more or less continuous line with the outer margins of the clypeus in full-face view. Dorsum and margins of clypeus densely clothed with elevated fine simple hairs which are directed anteriorly. Dorsum of head with decumbent curved fine hairs, those in front of the vertex directed towards the midline, the remainder directed towards the highest point of the vertex. Upper scrobe margins with projecting long flagellate hairs. (One pair is visible in the holotype, at the level of the scrobal apex; more may be present in undamaged specimens, but the holotype is somewhat abraded.) Head long and narrow, the CI of 51 is the lowest yet recorded in any Afrotropical *Smithistruma*. Between the posterior clypeal margin and the frontal lobes, and running back between the lobes, the surface depressed into a shallow inverted V-shaped trench. Upper scrobe margins pinched in behind the frontal lobes, evenly convex behind this and confluent with the convex sides of the head. Occipital margin concave and bordered by a raised lamelliform ridge or flange which is traversed by a number of ribs. In profile the antennal scrobes reduced and shallow, the preocular laminae low and inconspicuous. Clypeus very densely punctate-granular, the inverted V-shaped impression smooth. Cephalic dorsum to level of eyes finely reticulate-punctate, behind this the surface more grossly reticulate-punctate, the punctures becoming larger both posteriorly and away from the midline, and blanketing the entire surface. Antennae with 4 segments, the scape relatively very long (SI 116, the longest yet recorded among Afrotropical *Smithistruma*). The second funicular (third antennal) is an extremely long fusion segment constituting funicular segments 2–4 of the normal 5-merous funiculus; this second funicular segment almost two times longer than the first. On the right funiculus vague vestigial constrictions can be seen marking the original segmental limits, but on the right even these traces are absent. Scapes with simple fine hairs present, without bizarre pilosity; shaft of scape not bent nor flattened but increasing in thickness from base to apex. Pronotum marginate anteriorly and with a median longitudinal carina. Sides of pronotum and mesonotum not marginate but propodeal dorsum meeting the sides in an angle. Metanotal groove broad, deeply impressed, the impressed area blocked off at each side by a short longitudinal lamina running from the mesonotum to the propodeum. Propodeal dorsum with a sharp transverse rim bordering the metanotal impression posteriorly. In profile the propodeal teeth very thin apically, subtended by narrow translucent infradental lamellae. Sides of alitrunk unsculptured except for some weak peripheral punctation. Pronotal dorsum smooth near the median carina but laterally with some low disorganized sculpture. Mesonotum densely punctate. Metanotal groove, propodeal dorsum and declivity smooth except for a few vestigial punctures which are scarcely visible, situated on the propodeum just behind the transverse rim which borders the metanotal groove. Pronotal humeri with long flagellate hairs. Dorsal alitrunk with numerous simple hairs, without bizarre pilosity. Petiole missing from holotype. Postpetiole in profile broadly convex, the spongiform appendages poorly developed. Ventral appendage of postpetiole represented by a lobate translucent thin lamina which contains a few stiffening veins but is not spongiform. First gastral sternite with a basal felt-like fibrous pad which runs across the width of the sclerite, the fibres constituting the felt running longitudinally. In dorsal view the postpetiole unsculptured, bordered anteriorly by a narrow ribbed lamina, without lateral appendages. Posteriorly the postpetiole margin bordered by a ribbed lobate lamina on each side of a broad median gap. Basal lamella of first gastral tergite longitudinally concave and traversed by costulae which do not impinge upon the sclerite proper. This last only with very faint scratch-like markings near the base. Postpetiole with a few fine simple hairs and with fine appressed ground-pilosity. First gastral tergite only with fine appressed ground-pilosity. Colour medium brown.

Holotype worker, **Cameroun**: Nr Yaounde, sample 3123 (*G. Terron*) (ENSA).

The only known species closely related to *vodensa* is *tacta*; the two are separated as follows.

tacta	*vodensa*
Head relatively broad, CI 65–70.	Head relatively narrow, CI 51.
Scapes relatively short, SI 61–67.	Scapes relatively long, SI 116.
Smaller species, HL 0·42–0·46.	Larger species, HL 0·74.
Hairs on clypeal dorsum spatulate.	Hairs on clypeal dorsum simple.
Pronotum sharply marginate laterally.	Pronotum not marginate laterally.
Metanotal groove shallow to absent.	Metanotal groove broadly, deeply impressed.
Ventral appendage of postpetiole spongiform.	Ventral appendage of postpetiole laminar.

TRICHOSCAPA Emery

(Figs 21, 22)

Trichoscapa Emery, 1869*b*: 24 [as subgenus of *Strumigenys*]. Type-species: *Strumigenys (Trichoscapa) membranifera* Emery, 1869*b*: 24, fig. 11, by monotypy.
Trichoscapa Emery; Brown, 1948: 112. [Raised to genus.]

DIAGNOSIS OF WORKER. Afrotropical dacetine ants. Mandibles short triangular (MI 16–20), serially dentate and lacking an apical fork of spiniform teeth. When fully closed the dorsal surface of the mandible with a sharp conspicuous transverse basal margin which is separated from the anterior clypeal margin by a distinct impression or gap. Apical (masticatory) margin of mandible with 12 teeth following a basal lamella, the lamella inflected below the basalmost tooth, not visible when the mandibles are closed. Antennae with 6 segments.

This monotypic genus is very close to *Smithistruma*, being separated only by the differently constructed mandibles. The apparent strong transverse basal margin seen in *Trichoscapa* (Fig. 21) but not in *Smithistruma* (Figs 1–12, 14, 15, 17–20) is a secondary development caused by the dorsal surface of the mandible passing through a sudden downward near right-angled bend at the level of the basalmost tooth, this sharp downward angle running across the entire width of the mandible. The basal lamella, which follows the basalmost tooth in approximately the same plane in *Smithistruma*, is in *Trichoscapa* on the inner margin of the descending surface below the basalmost tooth, and so is usually invisible in full-face view even when the mandibles are open.

The single species included in *Trichoscapa, membranifera,* is an accomplished tramp species in the tropics and the warm temperate zones. Brown & Wilson (1959) suggested an African origin for the species but at that time no specimens of *membranifera* had been reported from the Afrotropical region. A single series from Sierra Leone (in BMNH) shows that the species does indeed occur in sub-Saharan Africa but whether this continent represents its place of origin remains to be seen, for this series may also represent an introduction.

The tramping ability of this small ant has ensured that it has accrued more than its fair share of synonyms. These are dealt with by Brown (1948), and I have no changes nor additions to make to the list.

Trichoscapa membranifera (Emery)

(Figs 21, 22)

Strumigenys (Trichoscapa) membranifera Emery, 1869*b*: 24, fig. 11. Holotype worker, ITALY: Napoli, Portici (MCSN) [examined].
Strumigenys membranifera race *simillima* Emery, 1890: 69, pl. 8, fig. 5. Holotype worker, ST THOMAS I. (West Indies) (MCSN). [Synonymy by Brown, 1948: 114.]
Strumigenys membranifera var. *santschii* Forel, 1904*a*: 6. Syntype workers, TUNISIA: Kairouan (*F. Santschi*) (MHN). [Synonymy by Brown, 1948: 114.]
Strumigenys (Cephaloxys) vitiensis Mann, 1921: 461, fig. 22c. Syntype workers, FIJI Is: Vanua Levu, Lasema (*W. M. Mann*) (MCZ) [Synonymy by Brown, 1948: 114.]
Strumigenys (Cephaloxys) silvestriana Wheeler, 1928: 27. Syntype workers, MACAO: (*F. Silvestri*) (MCZ) [Synonymy by Brown, 1948: 114.]
Strumigenys (Cephaloxys) foochowensis Wheeler, 1928: 28. Holotype female, CHINA: Foochow (*F. Silvestri*) (location of type unknown). [Synonymy by Brown, 1948: 114.]
Strumigenys (Cephaloxys) membranifera var. *marioni* Wheeler, 1933: 276. Syntype workers, U.S.A.: Mississippi (*M. R. Smith*) (MCZ). [Synonymy by Brown, 1948: 114.]
Strumigenys (Cephaloxys) membranifera var. *williamsi* Wheeler, 1933: 276. Syntype workers, HAWAII: S. of Olaa, off the road to Puna, iv.1932, under moss etc. (*F. X. Williams*) (MCZ). [Synonymy by Brown, 1948: 114.]
Trichoscapa membranifera (Emery) Brown, 1948: 113.

WORKER. TL 1·9–2·1, HL 0·46–0·50, HW 0·40–0·44, CI 84–90, ML 0·08–0·10, MI 16–20, SL 0·22–0·24, SI 51–57, PW 0·23–0·26, AL 0·50–0·53 (10 measured).

Mandibles with 12 teeth, arranged in a series of 7 larger teeth basally followed by a series of 4 denticles and a small apical tooth; the 7 basal teeth not all the same size. Dorsal surface of mandible sharply angled

downwards immediately behind the basalmost tooth, this angle running across the width of the mandible and forming a sharp transverse basal margin which is separated from the anterior clypeal margin by a gap or impression. Basal lamella of mandible situated on the descending inner margin below the basalmost tooth and not visible in full-face view. Anterior clypeal margin transverse to broadly shallowly convex, the clypeal margins both anteriorly and laterally lacking projecting hairs of any description. Dorsum of clypeus shining, sometimes with faint sculptural vestiges; dorsum of head behind clypeus reticulate-punctate and dull. Pilosity of head restricted to a single pair of standing hairs at the highest point of the vertex, otherwise the dorsum only having minute appressed pubescence which is very sparse and difficult to see. Clypeus and lateral margins of head hairless, without flagellate or other specialized hairs. Antennal scapes short, bent in the basal third and broadest at the bend, the leading edge with a row of spatulate to spoon-shaped freely projecting hairs. Eyes small, of only a few ommatidia, situated at the ventral scrobe margin. Pronotum strongly marginate anteriorly and laterally, mesonotum and propodeum not marginate. Dorsal outline of alitrunk in profile very shallowly concave between mesonotum and propodeum but the metanotal groove absent. Propodeum descending posteriorly to the broad strongly spongiform infradental lamellae. Separated propodeal teeth absent, either indistinguishable from the large infradental lamellae or at most forming a minute point close to the dorsum of the lamella. Sides of alitrunk smooth. Pronotal dorsum smooth or at most with only the very faintest vestiges of sculpture, which may include an extremely faint median longitudinal ridge. Mesonotum with some fine superficial punctures but these may be very feeble and difficult to see. Propodeal dorsum and declivity smooth. Standing hairs absent from dorsal alitrunk; scattered sparse minute appressed pubescence present. Humeral angles of pronotum without flagellate or other hairs. Spongiform appendages of the pedicel segments massively developed in profile. Petiole ventrally with a deep curtain-like appendage, the dorsum of the peduncle with a narrow spongiform strip which runs up almost to the highest point of the node. Lateral spongiform appendages of the petiole node large and strongly prominent. Lateral and ventral spongiform lobes of postpetiole very large, much larger than the exposed area of the disc. In dorsal view both petiole and postpetiole smooth, bounded laterally by dense spongiform tissue. Petiole node also with a posterior spongiform strip linking the large lateral appendages. Postpetiole also with transverse lamellate spongiform tissue bounding the anterior and posterior margins. Base of first gastral tergite with a transverse strip which is spongiform laterally but lamellate medially where it is overlapped by the convex posterior strip of the postpetiole. Basigastral costulae present, grouped on each side of a median clear area; the gaster otherwise unsculptured. Dorsal surfaces of petiole, postpetiole and gaster without hairs of any description but with minute appressed very sparse pubescence. Colour dull yellow to yellowish brown.

Superficially similar to some *Smithistruma* species, *T. membranifera* is easily distinguished from members of that genus by the characteristic form of the mandibles and strongly marginate pronotum, and by the near absence of standing hairs. Feeding behaviour of *membranifera* was investigated by Wilson (1954) who found that it would eat a wide range of small soft bodied arthropods.

MATERIAL EXAMINED

Sierra Leone: Njala (*E. Hargreaves*). **Egypt**: no loc. (Min. of Agriculture coll.); Banage (*Alfieri*). **U.S.A.**: Miss., West Point (*E. E. Byrd*). **Italy**: Napoli, Portici.

GLAMYROMYRMEX Wheeler

(Figs 23–33)

Glamyromyrmex Wheeler, 1915: 487. Type-species: *Glamyromyrmex beebi* Wheeler, 1915: 488, fig. 2, by monotypy.

Borgmeierita Brown, 1953*a*: 23. Type-species: *Codiomyrmex excisus* Weber, 1934: 51, fig. 9, by original designation. [Synonymy by Brown, 1973*a*: 35.]

DIAGNOSIS OF WORKER. Afrotropical dacetine ants. Mandibles relatively short (MI 8–24), subtriangular in full-face view and powerfully developed, serially dentate and lacking an apical fork of spiniform teeth. When fully closed the mandibles are overlapped basally by the clypeus. In profile the mandibles with their upper and lower margins diverging from base to apex and the distal portion passing into a strong downcurved arc so that part or most of the apical margin is at right-angles to the long axis of the head. Apical (masticatory) margin of mandible with 8–11 teeth following a conspicuously differentiated prominent basal lamella; the basal series of teeth following the lamella large and strong, the lamella itself partially or wholly concealed by the clypeus when the mandibles are closed. Antennae with 6 segments.

Two species from the Afrotropical region which were formerly included in *Codiomyrmex* are here transferred to *Glamyromyrmex*. Brown (1973*b*) has indicated that the former name may be a junior synonym of the latter. Whether this proves to be correct or not, the previously described Afrotropical species are certainly closer to the type-species of *Glamyromyrmex* than they are to the type-species of *Codiomyrmex* (*C. thaxteri* Wheeler). At present there are 11 Afrotropical and 7 Neotropical species of *Glamyromyrmex* known, though it is most likely that some or all of the species currently placed in *Codiomyrmex* and *Chelystruma*, from Australia and the Neotropical region, may be referred to *Glamyromyrmex* in the future. *Glamyromyrmex* and its relatives are closely related to *Smithistruma*, differing in the much more powerful construction of the mandibles in the former. The species currently placed in *Glamyromyrmex* are a fairly diverse assemblage and may even represent several separate lines of descent from *Smithistruma*-like ancestral forms. As mentioned under *Smithistruma* the stability of the short-mandibulate dacetine genera is in question and a world revision of them would most probably show some marked changes in generic limits.

Previous work on *Glamyromyrmex* has mostly been limited to the description of new species but the genus has been defined by Brown (1950*a*) on the basis of the sparse material then available, and the Neotropical species have been keyed by Kempf (1960).

List of Afrotropical *Glamyromyrmex*

***tetragnathus*-group**
- ***africanus* sp. n.**
- ***tetragnathus*** (Taylor) **comb. n.**

***dagon*-group**
- ***dagon* sp. n.**
- ***sahurus* sp. n.**

***loveridgei*-group**
- ***crypturus* sp. n.**
- ***loveridgei*** (Brown) **comb. n.**
- ***sistrurus* sp. n.**

***ravidurus*-group**
- ***ravidurus* sp. n.**

***thuvidus*-group**
- ***thuvidus* sp. n.**
- ***trymalus* sp. n.**
- ***tukultus* sp. n.**

Key to species (workers)

1 Clypeal dorsum without appressed small hairs of any description, all hairs present on the clypeal dorsum conspicuously elevated. (Cameroun) .... ***trymalus*** (p. 333)

– Clypeal dorsum with appressed small hairs which may be simple, spatulate or scale-like 2

2 Appressed hairs on clypeus simple, fine and minute 3

– Appressed hairs on clypeus flattened, spatulate or scale-like 6

3 Posteromedian area of cephalic dorsum raised into a broad tumulus which is bounded laterally by an approximately flat area on each side (Fig. 27). Pronotum laterally sharply marginate throughout, the margins overhanging the sides (Fig. 30). Postpetiolar disc finely longitudinally costulate 4

– Posteromedian area of cephalic dorsum not raised into a broad tumulus, instead the dorsum is more or less evenly convex from side to side. Pronotum laterally not sharply marginate throughout. Postpetiolar disc smooth or at most with lateral shagreening 5

4 Lateral margins of head in full-face view with projecting flagellate hairs. Postpetiole and first gastral tergite with numerous long flagellate hairs. (Gabon) .... ***africanus*** (p. 322)

– Lateral margins of head in full-face view without flagellate hairs. Postpetiole and first gastral tergite with sparse short straight hairs. (Cameroun, Angola) .... ***tetragnathus*** (p. 323)

5 With the head in profile the edges of the clypeal lobes enormously thickened, much thicker than the maximum width of the scape (Fig. 32). Anterior clypeal margin with a semicircular median impression flanked by a lobe on each side (Fig. 25). CI 70–71, MI 8–9. (Rwanda) ...... ***dagon*** (p. 325)

– With the head in profile the edges of the clypeal lobes narrow, narrower than the maximum width of the scape (Fig. 33). Anterior clypeal margin broadly evenly shallowly concave from corner to corner (Fig. 26). CI 75–78, MI 16–17. (Rwanda) .... ***sahurus*** (p. 326)

6 Entire cephalic dorsum densely clothed with appressed scale-like hairs, without other pilosity of any description and the sides of the head without projecting flagellate hairs 7

– Cephalic dorsum not clothed with appressed scale-like hairs, with other pilosity present, and the sides of the head with projecting flagellate hairs 8

7 First gastral tergite with erect fine simple hairs present. (Ivory Coast) .... ***tukultus*** (p. 334)

– First gastral tergite with appressed spatulate to scale-like hairs only. (Cameroun) .. ***ravidurus*** (p. 331)

8 Cephalic dorsum behind clypeus with widely spaced broad foveolate punctures, with a cratered appearance, the surface smooth between the punctures. Minute yellow species, HL 0·43–0·44, HW 0·29. (Kenya) .... ***thuvidus*** (p. 332)

– Cephalic dorsum behind clypeus reticulate-punctate, without widely spaced broad foveolate punctures, without a cratered appearance. Larger black or blackish brown species, HL 0·49 or more, HW 0·34 or more 9

9 With postpetiole in dorsal view the sides of the disc completely enclosed by dense spongiform tissue. Dorsum of petiole node sculptured, at least in part. Basal lamellate band of first gastral tergite broad and continuous, indented anteromedially but not interrupted 10

– With postpetiole in dorsal view the spongiform tissue restricted to the posterolateral angles of the disc and fading out anteriorly. Dorsum of petiole node unsculptured and smooth. Basal lamellate band of first gastral tergite narrow at sides and interrupted medially. (Malawi) ***loveridgei*** (p. 328)

10 Mandible with 6 enlarged teeth, without medially projecting broad spatulate hairs between the basalmost tooth and the basal lamella (Fig. 24). (Cameroun) .... ***sistrurus*** (p. 329)

– Mandible with 5 enlarged teeth, with medially projecting broad spatulate hairs between the basalmost tooth and the basal lamella (Fig. 23). (Ghana) .... ***crypturus*** (p. 327)

The *tetragnathus*-group

(Figs 27, 30)

Outline shape of head as Fig. 27. Mandibles with 8 teeth consisting of 5 large slightly recurved spiniform teeth following the basal lamella, and an apical series of 3 denticles which share a common base. Anterior clypeal margin indented medially. Lateral clypeal margin not expanded into a broad lobe on either side, the outer margins of the mandibles at full closure intersecting the anterior clypeal margin at or very close to the anterolateral corners. Head dorsoventrally flattened, the dorsum posteromedially raised into a broad tumulus. Broad rounded occipital lobes present which are strongly prominent posteriorly. Pronotum sharply marginate laterally, the marginations overhanging the sides and the dorsum between the marginations shallowly transversely concave. Sculpture of cephalic dorsum behind clypeus weak and superficial, without well-developed rugulose or punctate sculpture. Clypeus with minute appressed pubescence.

The two species placed in this group, *africanus* and *tetragnathus*, are closely related forms, very conspicuous in appearance and easily distinguished from all the other Afrotropical members of *Glamyromyrmex*. They are the members of this genus which least resemble *Smithistruma* and the construction of the head renders them immediately recognizable.

Both species are of central African origin, with *africanus* known from Gabon and *tetragnathus* from Cameroun and Angola.

Glamyromyrmex africanus sp. n.

(Fig. 27)

Holotype worker. TL 3·0, HL 0·82, HW 0·70, CI 85, ML 0·16, MI 20, SL 0·30, SI 43, PW 0·36, AL 0·68.

Mandibles with a broad basal lamella (partially visible as mandibles slightly opened) followed by a principal dental row of 5 large triangular teeth which are slightly recurved and evenly spaced on the strongly downcurving arch of the mandibular masticatory margin. Basalmost tooth following the lamella without a diastema, slightly smaller than the second tooth. Third tooth from the basal lamella the largest, fourth and fifth tooth slightly smaller. Distal to the principal dental row is a series of three denticles which share a common base. In profile the mandibles rapidly increasing in width from base to apex, the upper and lower borders strongly divergent, the former arching up above the level of the anterior clypeal margin, the latter shallowly concave and downcurved; apical margin as seen in profile strongly arched-convex. With the head in full-face view the anterior clypeal margin with a concave median indentation, the clypeus broad but the lateral free margins not extended into lobes and noticeably narrower than the sides of the head behind the clypeus. Sides of head evenly shallowly convex, broader behind than in front. Occipital margin extended backwards as a rounded lobe on each side of a central broad impression, the median portion of which is transverse. The margin of the occipital impression bounded on the dorsum by a continuous low rim or crest. Dorsum of head behind clypeus raised medially into a broad tumulus which is convex in both directions but does not reach the lateral margins; rather the tumulus is surrounded on all sides by more or less flat areas of cuticle. Frontal lobes and frontal carinae fused to form a continuous upper scrobe margin

which is strongly prominent laterally, conceals the scrobes from dorsal view, and is continuous with the flattened posterolateral portions of the head. Antennal scrobes deep and extensive, anteriorly divided into upper and lower compartments by the weak preocular laminae and with the small eye situated on the ventral scrobe margin. In profile the dorsal cephalic tumulus is balanced by an even more strongly prominent mid-ventral tumulus whose maximum convexity occurs at about the level of the eye and behind which the ventral surface is markedly concave. Antennal scapes short (SI 43) and feebly clavate, not bent near the base, the leading edge evenly shallowly convex and lacking projecting hairs. Dorsum of head with dense abundant decumbent to appressed fine simple hairs, shortest near the clypeus (which has only minute fine pubescence) and longest occipitally, directed anteriorly or anteromedially and densest on the lateral margins; the latter also with 3 pairs of long projecting flagellate hairs. Dorsum of head with minute shallow pits from which the hairs arise, otherwise unsculptured except for a feeble superficial shagreening in places; clypeus smooth. Sides of alitrunk sharply laterally marginate throughout, most strongly so on the pronotum where the marginations are prominent and overhang the sides. Pronotum also marginate anteriorly and with a median longitudinal ridge or carina dorsally. Dorsum of mesonotum separated from the short propodeal dorsum by a low transverse crest; metanotal groove absent. Propodeal teeth very broad basally, rapidly tapering apically and with the extreme apices upcurved. Infradental lamellae much narrower than the propodeal teeth, the latter with more than half their length standing free of the lamellae. Sides of alitrunk unsculptured except for the punctate mesopleuron. Dorsal alitrunk with a few superficial rugular vestiges on the promesonotum but only the median carina conspicuous. Lateral margination of the alitrunk with 2–3 long flagellate hairs on each side, otherwise the dorsum and margins only with fine scattered simple pilosity. Peduncle of petiole long, the node bluntly triangular in profile. Spongiform ventral process of petiole peduncle massively developed and curtain-like, about as deep as the node is high. Other spongiform material on petiole reduced to a pair of short aliform prominences situated lateroventrally when the node is viewed from above and from which a narrow crest arises which follows the posterior margin of the node. Petiole node sparsely rugulose, disc of postpetiole sparsely irregularly longitudinally costulate. Ventral spongiform appendages of postpetiole moderate, the lateral appendages narrow in dorsal view, broadest at the posterolateral angles. Anterior face of postpetiolar disc with a narrow bordering lamella, the posterior margin without spongiform material, bordered instead only by a sharp narrow and shallowly convex rim which abuts a similar but concave rim bordering the base of the first gastral tergite. First gastral tergite without basal spongiform material but with a lamellate area laterobasally, immediately behind the lateral appendages of the postpetiole; this lamellate area thrown into strong ridges which form the origins of the lateral basigastral costulae. First gastral sternite without a basal spongiform pad. Primary basigastral costulae, arising at the base of the tergite, few in number and mostly lateral in origin; more posteriorly numerous finer costulae arise which form a dense band over about one-third of the length of the tergite. Petiole, postpetiole and first gastral tergite with numerous long fine flagellate hairs. Black, the spongiform appendages pale.

Holotype worker (gold-palladium coated), **Gabon**: Makokou, berlese no. 17, x–xii. 1972, rain forest (*I. Lieberburg*) (MCZ).

The only known close relative of *africanus* is *tetragnathus*, from Cameroun and Angola. Differences to separate these two species are tabulated under *tetragnathus*.

Glamyromyrmex tetragnathus (Taylor) comb. n.

(Fig. 30)

Codiomyrmex tetragnathus Taylor, 1965: 225, figs 1, 2. Holotype worker, ANGOLA: Dundo, Route Turismo, approx 7°02′S, 20°51′E, gallery forest, 28.iii.1962, no. 16888, R. Luachimo, 'berlesate by native collector' (MCZ) [examined].

WORKER. TL 2·4–2·8, HL 0·60–0·70, HW 0·49–0·58, CI 79–83, ML 0·14–0·16, MI 22–24, SL 0·25–0·28, SI 47–51, PW 0·28–0·34, AL 0·58–0·62 (4 measured).

Mandibles with a broad basal lamella followed by a row of 5 large triangular teeth which are slightly recurved and evenly spaced on the strongly downcurving arch of the apical margin. Distal to this tooth row is a series of 3 denticles which share a common base on a low process. In profile the mandibles rapidly increasing in width from base to apex, the upper and lower borders strongly divergent, the former arching up above the level of the anterior clypeal margin, the latter shallowly concave and downcurved; apical margin as seen in profile strongly arched-convex. With the head in full-face view the anterior clypeal margin with a median indentation, the clypeus broad but the lateral free margins not extended into lobes and noticeably narrower than the sides of the head behind the clypeus. General shape of head in profile and

full-face views as described for *africanus*. Antennal scapes short (SI 47–51) and feebly clavate, not bent near the base, with the leading edge more or less evenly convex and lacking projecting hairs. Clypeal dorsum with minute appressed pubescence which is directed anteriorly. Dorsum of head with anteriorly or anteromedially directed minute appressed hairs which are approximately the same length everywhere on the dorsum and no longer than the clypeal pubescence. Lateral margins of head without flagellate hairs. Clypeus smooth. Dorsum of head with minute scattered pits from which the hairs arise, otherwise unsculptured except for a feeble superficial shagreening in places. Sides of alitrunk sharply laterally marginate throughout their length, most strongly so on the pronotum where the marginations are prominent and overhang the sides. Pronotum also marginate anteriorly and with a median longitudinal ridge or carina dorsally. Dorsum of mesonotum separated from the short propodeal dorsum by a low transverse crest; metanotal groove absent. Propodeal teeth very broad basally, rapidly tapering apically and with the extreme apices suddenly upcurved. Infradental lamellae much narrower than the propodeal teeth, the latter with more than half their length standing free of the lamellae. Sides of alitrunk unsculptured except for the punctate mesopleuron and some weak peripheral sculpture round the margins of the segments. Dorsal alitrunk with some superficial rugular vestiges on the pronotum and mesonotum beside the median carina. Lateral margins of alitrunk with two pairs of long simple hairs, the first pair at the pronotal humeri, the second pair just in front of the transverse crest that separates mesonotum from propodeum. Dorsal alitrunk otherwise with only sparse appressed simple hairs which are very short. Spongiform ventral appendage of petiole peduncle massively developed and curtain-like, about as deep as the node is high. Other spongiform material on petiole reduced to short aliform prominences situated lateroventrally when the node is viewed from above. Petiole node sparsely rugulose, disc of postpetiole finely densely and quite regularly longitudinally costulate. Lateral spongiform appendages of petiole narrow in dorsal view, broadest posterolaterally. Anterior face of the postpetiolar disc with a narrow bordering lamella, the posterior margin bordered by a convex rim which abuts a similar but concave rim bordering the base of the first gastral tergite. First gastral tergite lamellate basally, not spongiform, with numerous strong basigastral costulae and with many secondary costulae arising between them on the body of the tergite. First gastral sternite without a basal spongiform pad. Petiole, postpetiole and first gastral tergite with scattered short straight simple hairs. Colour blackish brown to black.

The only known relative of *tetragnathus* is *africanus*; the two are separated as follows in the worker.

africanus	*tetragnathus*
Larger species with shorter antennal scapes, HW 0·70, SI 43.	Smaller species with longer antennal scapes, HW 0·49–0·58, SI 47–51.
Lateral margins of head in full-face view with 3 pairs of projecting flagellate hairs.	Lateral margins of head in full-face view without flagellate hairs.
Appressed cephalic pilosity longer posteriorly than anteriorly; much longer than the clypeal pubescence.	Appressed cephalic pilosity very short, of approximately equal length everywhere; no longer than the clypeal pubescence.
Postpetiole and first gastral tergite with numerous long fine flagellate hairs.	Postpetiole and first gastral tergite with simple sparse short straight hairs.

Material examined

Cameroun: Nkoemvon (*D. Jackson*); nr Yaounde (*G. Terron*). **Angola**: Dundo.

The *dagon*-group

(Figs 25, 26, 32, 33)

Outline shape of head as Figs 25, 26. Mandibles with 8 teeth consisting of a small denticle close to the basal lamella followed by a series of 5 large teeth and an apical pair of denticles which arise from a common base. Anterior clypeal margin broadly and evenly concave or sharply indented medially. Lateral clypeal margins expanded into a lobe on each side, the outer margins of the mandibles at full closure intersecting the anterior clypeal margin some distance medially of the anterolateral corners. Head not dorsoventrally flattened, without a broad convex tumulus posteromedially on the dorsum. Posteriorly projecting rounded occipital lobes absent. Pronotum not sharply marginate laterally, the dorsum transversely flat to shallowly

convex. Cephalic sculpture behind clypeus finely and very densely reticulate-punctate, with a granular appearance. Clypeus with minute appressed pubescence.

The two species in this group, *dagon* and *sahurus*, are both known only from Rwanda. They are characterized chiefly by their dentition and their possession of a broad clypeus whose free lateral margins are convex and expanded into a lobe on each side. The character is much more strongly expressed in *dagon* than in *sahurus* and is accompanied in the former by a massive thickening of the lateral free margins of the clypeus.

Glamyromyrmex dagon sp. n.

(Figs 25, 32)

Holotype worker. TL 2·0, HL 0·57, HW 0·40, CI 70, ML 0·05, MI 9, SL 0·24, SI 60, PW 0·26, AL 0·52.

Mandibles appearing very short in full-face view (MI 8–9) as the apical (masticatory) margin is at a right-angle to the long axis of the head from the second tooth to the apex. Basal lamella of mandible, which is concealed by the clypeus at full closure, followed by a short diastema and a denticle. Distal to the denticle is a row of 5 large teeth which are slightly recurved, and apically two denticles which share a common base are present. In profile the upper mandibular margin curves upwards above the level of the anterior clypeal margin and the apical (masticatory) margin forms a near-vertical shallowly convex arch. Anterior clypeal margin in full-face view convex on each side of a deep median concavity, the lateral free margins of the clypeus expanded into a smoothly rounded prominent broad lobe on each side so that the outer margins of the closed mandibles intersect the anterior clypeal margin some distance medially of the anterolateral corners. Upper scrobe margins shallowly concave and feebly divergent posteriorly, the lateral margins of the occipital lobes behind this are shallowly convex and round behind into the smoothly concave occipital margin. In profile the edges of the laterally expanded clypeal lobes are greatly thickened in front of the level of the antennal insertions, the maximum thickness distinctly greater than the maximum width of the scape. Eyes present, small, situated on the ventral margin of the deep scrobe. Scapes of moderate length (SI 60), narrowly clavate and lacking projecting hairs on the leading edges. Dorsum of head with a single pair of erect fine hairs situated on each side of the midline close to the occipital margin. Otherwise the head only with very short fine simple hairs everywhere which are appressed and directed anteriorly; flagellate long hairs absent. Clypeus with scattered minute appressed pubescence only. Dorsum of clypeus, and of head in a band immediately behind the clypeus, glassy smooth. Remainder of cephalic dorsum finely and densely reticulate-punctulate. Anterior border of pronotum narrowly marginate, the sides of the pronotum immarginate anteriorly but separated from the dorsum by a blunt angle posteriorly. In profile the promesonotum dorsally forming a single convex outline which is separated from the propodeal dorsum by a small step, which appears as a transverse rim in dorsal view, the propodeum being on a slightly lower level than the mesonotum and marginate laterally. Infradental lamellae of propodeum broad, the propodeal teeth represented only by a short narrow denticle standing free of the lamella. Sides of alitrunk glassy smooth except for peripheral punctate sculpture. Pronotal dorsum unsculptured, mesonotum densely punctate, propodeum smooth anteriorly but with some punctures between the bases of the teeth. Pronotum and mesonotum each with a single pair of long erect simple hairs, the dorsum otherwise only having scattered short appressed hairs which are directed roughly towards the midline. Spongiform appendages of pedicel segments massively developed in profile. Petiole node in dorsal view unsculptured, broader than long, flanked on each side by a prominent spongiform process, the two linked across the posterior margin of the node by a narrow lamella. Disc of postpetiole glassy smooth, very broad and surrounded by spongiform or lamellate tissue on all sides. Spongiform tissue broadest posterolaterally, narrowest medially where it is contracted down to a very narrow rim along the posterior margin of the disc. Base of first gastral tergite with a spongiform strip which is thickest laterally. Basigastral costulae sparse in centre of tergite, denser laterally. Dorsal surfaces of petiole, postpetiole and gaster with sparse erect simple pilosity and also with much shorter appressed widely scattered simple hairs. Colour yellowish brown.

Paratype worker. TL 2·1, HL 0·59, HW 0·42, CI 71, ML 0·05, MI 8, SL 0·25, SI 60, PW 0·28, AL 0·56. As holotype.

Holotype worker, **Rwanda**: Rangiro, i.1976, forest humus, 1800 m (*P. Werner*) (MHN).
Paratype. 1 worker with same data as holotype (BMNH).

G. dagon is immediately recognizable as no other African species has such short mandibles or such a bizarre clypeal structure. Its only close relative is *sahurus* and characters separating the two are tabulated under the latter name.

Glamyromyrmex sahurus sp. n.

(Figs 26, 33)

Holotype worker. TL 2·3, HL 0·56, HW 0·42, CI 75, ML 0·09, MI 16, SL 0·25, SI 57, PW 0·28, AL 0·58.

Mandibles in full-face view with the basal lamella mostly concealed by the clypeus at full closure but its margin continued as an oblique edge leading to the first tooth, which is thus some distance from the clypeal margin. Basalmost tooth small, reduced to a denticle. Distal to this is a row of 5 large teeth which are slightly recurved, and apically two denticles which share a common base are present. In profile the upper and lower mandibular margins are strongly divergent from base to apex, the dorsal margin curving upwards until it is above the level of the anterior clypeal margin and the apical (masticatory) margin forming a shallowly convex arch which is approximately at a right-angle to the long axis of the head. Anterior clypeal margin shallowly concave in full-face view, the lateral free clypeal margins expanded into a broad but shallow lobe on each side. Upper scrobe margins divergent posteriorly, straight to very shallowly concave. Posteriorly the upper scrobe margins merge with the weakly convex lateral occipital lobes which round posteriorly into the broadly shallowly concave occipital border. In profile the lateral free margins of the clypeal lobes not grossly thickened, narrower than the maximum width of the scape. Eyes present, small, situated on the ventral margin of the deep scrobe. Scapes of moderate length (SI 57–60), narrowly clavate and lacking projecting hairs on the leading edges. Dorsum of head with a pair of erect fine hairs situated close to the midline and close to the occipital margin. Head otherwise devoid of elongate hairs; lacking flagellate hairs but fairly densely clothed with curved to hooked anteriorly directed short simple hairs. Clypeus with minute appressed pubescence only. Clypeus shiny with a superficial punctulate patterning; dorsum of head behind clypeus finely but very densely and conspicuously reticulate-punctate and dull. Anterior pronotal border weakly marginate, the sides not marginate and rounded anteriorly but separated from the dorsum by a weak blunt angle posteriorly. Mesonotum not, and propodeum only weakly bluntly marginate laterally. Mesonotum separated from propodeum on dorsum by an extremely feeble ridge or crest. In profile the mesonotum slightly raised but not separated from the propodeum by a groove. Propodeal teeth vestigial to absent, not or only weakly differentiated from the infradental lamellae as minute points. Sides of alitrunk glassy smooth, without sculpture except on the extreme periphery. Pronotal dorsum unsculptured and shining; mesonotum with a smooth median longitudinal strip but punctate on each side of it; propodeum smooth anteriorly but punctate at the top of the declivity. Pronotum and mesonotum each with a single pair of long fine subflagellate hairs, otherwise only short simple appressed hairs which are directed towards the midline are present. Spongiform appendages of pedicel segments massively developed in profile. Petiole node in dorsal view unsculptured, broader than long, equipped with a strongly prominent spongiform process on each side and the two linked by a narrow lamella which runs across the posterodorsal margin of the node. Postpetiolar disc with a smooth broad median longitudinal strip but with faint shagreening on each side, the postpetiole surrounded by spongiform or lamellate material. The shallowly convex anterior margin of the postpetiole is bordered by a narrow lamella which is confluent with the lateral spongiform tissue on each side. The latter is thickest posterolaterally but narrows down to a vestigial strip posteromedially where the posterior postpetiolar margin is most strongly convex. Base of first gastral tergite with a spongiform transverse trip which narrows medially behind the posteriormost point of the postpetiole. First gastral tergite with conspicuous dense basigastral costulae grouped on each side of a median smooth area. Dorsal surfaces of petiole, postpetiole and first gastral tergite with scattered erect fine hairs and with scattered short simple appressed hairs. Colour brown.

Paratype workers. TL 2·1–2·3, HL 0·52–0·56, HW 0·40–0·42, CI 75–78, ML 0·09, MI 16–17, SL 0·24–0·25, SI 57–60, PW 0·26–0·28, AL 0·54–0·58 (3 measured).

As holotype but the mesonotal sculpture may consist of punctures everywhere, obliterating the median clear area seen in the holotype.

Holotype worker, **Rwanda**: Rangiro, ix.1976 (*P. Werner*) (MHN).

Paratypes. 3 workers with same data as holotype (MHN; BMNH; MCZ).

Along with *dagon, sahurus* forms a close species-pair known only from Rwanda and characterized by the form of the mandibles and clypeus, though the modification of the latter is much more extreme in *dagon* than in *sahurus* (Figs 25, 26). The two species are separated as follows in the worker.

dagon	*sahurus*
CI 70–71, MI 8–9	CI 75–78, MI 16–17.

dagon – cont.	*sahurus – cont.*
Anterior clypeal margin with a deep median impression flanked on each side by a convex lobe.	Anterior clypeal margin shallowly concave.
Lateral free margins of clypeal lobes greatly thickened, thicker in profile than the maximum width of the scape.	Lateral free margins of clypeal lobes not thickened, in profile much narrower than the maximum width of the scape.
Lateral portions of postpetiolar disc smooth.	Lateral portions of postpetiolar disc finely sculptured.

The *loveridgei*-group

(Figs 23, 24)

Outline shape of head as Figs 23, 24. Mandibles with 7–8 teeth. Either with 6 teeth plus a pair of apical denticles which share a common base (*sistrurus*), or with 5 teeth plus an apical series of 3 denticles which share a common base (*loveridgei*), or with 5 teeth plus a minute apical pair of denticles (*crypturus*). Anterior clypeal margin shallowly convex to extremely feebly evenly concave, not indented medially nor deeply concave. Lateral clypeal margins not expanded into lobes on each side, the outer margins of the mandibles at full closure intersecting the anterior clypeal margin at the anterolateral corners. Head not dorsoventrally flattened and without a posteromedian broad tumulus dorsally. Posteriorly projecting rounded occipital lobes absent. Pronotum not sharply marginate laterally, the dorsum transversely convex to approximately flat. Sculpture of head behind clypeus strongly reticulate-punctate. Clypeus with scale-like to spatulate appressed hairs. Flagellate hairs present on lateral margins of head.

G. loveridgei from Malawi, and the westerly distributed species *sistrurus* from Cameroun and *crypturus* from Ghana, have the head more strongly sculptured than in other Afrotropical representatives of the genus. Basically this sculpture is a strong dense reticulate-punctation but a tendency to rugulation is present due to the alignment of adjacent punctures, whose walls form rugule-like ridges.

Glamyromyrmex crypturus sp. n.

(Fig. 23)

Holotype worker. TL 2·0, HL 0·53, HW 0·37, CI 70, ML 0·10, MI 19, SL 0·21, SI 57, PW 0·24, AL 0·54.

Mandibles with a principal row of 5 enlarged teeth. Basally the mandible with a broad and extensive lamella which has in the small diastema between itself and the basalmost tooth a medially directed long broadly spatulate hair. An even longer but not so broadly spatulate hair projects medially from a point closer to the clypeus but more remote from the masticatory margin than the broadly spatulate hair. If the mandibles are fully closed (ajar in the holotype) these hairs may be difficult to see. Basalmost tooth smaller than the more strongly recurved second tooth, the second smaller than the third and fourth, the fifth slightly smaller than the fourth. Distal to the fifth tooth detail is difficult to see but there appears to be a pair of vestigial denticles. In profile the upper and lower mandibular margins are strongly divergent from base to apex and the upper margin curves up above the level of the anterior clypeal margin. The apical margin, from the second tooth to the apex, is almost at right-angles to the long axis of the head. Anterior clypeal margin transverse, the lateral free margins diverging anteriorly from the frontal lobes and with a few projecting spatulate to spoon-shaped hairs. Maximum width of clypeus greater than the width across the frontal lobes. Upper scrobe margins diverging posteriorly, the sides of the head convex and the occipital margin concave. Eyes small, situated on the ventral scrobe margin. Antennal scapes weakly clavate, the leading edges shallowly convex and equipped with apically curved spatulate hairs. Clypeus densely clothed with appressed small scale-like hairs which are distinctly shorter than the basalmost tooth. Hairs on dorsum of head immediately behind the clypeus short spatulate and appressed, but moving towards the occiput the hairs become more elevated and more narrowly spatulate, anteriorly arched or curved. At the highest point of the vertex the hairs are narrowly spatulate but further back they become simple, though still curved anteriorly. Clypeus smooth and shining, remainder of cephalic dorsum broadly and strongly reticulate-punctate. Three pairs of long flagellate hairs present; one pair on the dorsum close to the occipital margin, one pair at the occipital corners and one pair at the apices of the scrobes. Anterior border of pronotum marginate, the sides not marginate. Sides of mesonotum and propodeum marginate, the latter more strongly so than the former, the two not separated by a ridge or crest across the dorsum.

Promesonotal dorsum in profile forming a more or less even shallow convexity which is on a slightly higher level than the propodeum. Metanotal groove absent. Propodeal teeth incorporated in the infradental lamellae. Sides of alitrunk smooth except for a few longitudinal rugulae anteriorly on the pronotum. Dorsal alitrunk smooth except for some weak sculptural vestiges on the mesonotum which, however, is mostly smooth. Pronotum and mesonotum each with a single pair of long flagellate hairs, otherwise the dorsum only with scattered fine simple hairs which are arched towards the midline. Spongiform appendages massively developed in profile. Petiole node in dorsal view roughly transversely rectangular, slightly broader than long and fractionally broader behind than in front, the anterolateral angles approximately right-angular and the surface with scattered weak punctures. Spongiform material strongly prominent posterolaterally, linked across the posterior margin of the node by a broad translucent lamella. Postpetiolar disc smooth and shining, surrounded on all sides by dense spongiform tissue. Posteromedially the spongiform tissue narrowing down to a slender lamella. Base of first gastral tergite with a broad transverse ridged lamellate strip which is shallowly concave anteromedially but not interrupted. Basigastral costulae short, arranged in two groups, on each side of a clear median strip; the costulae shortest near this clear area and longer laterally. Petiole dorsum with simple long fine hairs which are curved posteriorly. Postpetiole with simple fine hairs which are mostly erect or suberect and hooked or curved apically. Gaster with scattered simple erect hairs. Colour blackish brown.

Holotype worker, **Ghana**: Tafo, 29.xi.1969, ant ecology sample AES 433 (*D. Leston*) (BMNH).

Closest related to *sistrurus*, characters separating *sistrurus* and *crypturus* are tabulated under the former name.

Glamyromyrmex loveridgei (Brown) comb. n.

Codiomyrmex loveridgei Brown, 1953*a*: 21. Holotype worker, Malawi: N. Prov., Nyika Plateau, above Nchenachena, 5000 ft (1524 m), 1948 (*A. Loveridge*) (MCZ) [examined].

Worker. TL 2·2, HL 0·54, HW 0·39, CI 72, ML 0·11, MI 20, SL 0·22, SI 56, PW 0·27, AL 0·54.

Mandibles with a broad basal lamella which is followed without a diastema by 5 enlarged teeth and an apical series of 3 denticles which share a common base. Upper and lower mandibular margins in profile strongly divergent from base to apex, the apical (masticatory) margin a strongly downcurved arch but the dorsal mandibular border not upcurved beyond the level of the anterior clypeal margin. In full-face view the anterior clypeal margin shallowly convex; posteriorly the clypeus narrowing to the frontal lobes and the preocular laminae visible. Upper scrobe margins divergent posteriorly from the small frontal lobes, not strongly expanded laterally. Behind the level of the scrobes the sides shallowly convex and rounding into the more or less transverse occipital border. Eyes small, situated on the ventral scrobe margin. Antennal scapes slightly curved and feebly clavate, the leading edge lacking long projecting hairs but with numerous fine apically directed simple decumbent hairs. Clypeal dorsum densely clothed with elongate flattened scale-like hairs which are directed forwards and are closely appressed to the surface. Remainder of cephalic dorsum with decumbent fine dense anteriorly arched simple hairs. Close behind the clypeal posterior margin the hairs are intermediate in shape between the scale-like clypeal pilosity and the simple cephalic hairs, being narrowly spatulate or feebly clavate apically. A laterally projecting long flagellate hair present at the apex of the antennal scrobe on each side and another at each occipital corner. Clypeus shiny and very smooth, the remainder of the head densely reticulate-punctate. Anterior border of pronotum marginate, the pronotal sides bluntly marginate posteriorly but the sides broadly rounding into the dorsum anteriorly. Mesonotum not and propodeum only weakly laterally marginate. On the dorsum the mesonotum and propodeum separated only by a change of sculpture, without a transverse ridge or crest. In profile the metanotal groove absent, the propodeal teeth triangular and confluent with the conspicuous infradental lamellae. Sides of alitrunk unsculptured except for a few strong punctures anteriorly on the pronotum and feeble peripheral sculpture dorsally and posteriorly. Dorsal surfaces of pronotum and propodeum smooth and shiny, the mesonotum densely punctate. A pair of long fine subflagellate hairs present at the pronotal humeri, and another pair on the mesonotum; otherwise the dorsal alitrunk only with scattered fine hairs which are decumbent to appressed and directed approximately towards the midline. Spongiform appendages of pedicel segments conspicuously developed in profile. In dorsal view the petiole node much broader than long, with a pair of small lateral spongiform lobes connected across the posterior margin of the node by a vestigial lamellar strip. Postpetiole in dorsal view with a narrow lamella bordering the anterior margin, the lateral spongiform tissue broad behind but fading out anteriorly; the posterior margin only with a narrow transverse lamellar strip joining the two posterolateral spongiform masses. First gastral tergite basally with a narrow transverse strip of spongy lamellar tissue which is concave and interrupted medially. Dorsal surfaces of petiole and postpetiole smooth; first gastral tergite with basal costulae dense

on each side of a median strip where they are short and sparse. Simple fine standing hairs present on dorsal surfaces of petiole, postpetiole and first gastral tergite together with shorter sparse decumbent to appressed simple hairs. Colour brown.

Known only from the holotype worker, the Malawian *loveridgei* is closest related to the West African *sistrurus* and *crypturus*. In the worker they are quickly separated by the following characters.

loveridgei	*sistrurus* and *crypturus*
Mandibles with 3 apical denticles sharing a common base.	Mandibles with 2 apical denticles sharing a common base.
Mesonotum densely punctate.	Mesonotum mostly or wholly smooth.
Petiole node dorsally much broader than long, the surface smooth.	Petiole node dorsally only marginally broader than long, the surface sculptured.
Disc of postpetiole in dorsal view with thick spongiform material posterolaterally, fading out to nothing anteriorly.	Disc of postpetiole in dorsal view with thick spongiform material visible all along the sides.
Basal transverse lamellate strip of first gastral tergite narrow and interrupted medially.	Basal transverse lamellate strip of first gastral tergite broad, shallowly concave medially but not interrupted.

Material examined

Malawi: Nyika Plateau, above Nchenachena (*A. Loveridge*).

Glamyromyrmex sistrurus sp. n.

(Fig. 24)

Holotype worker. TL 2·0, HL 0·50, HW 0·35, CI 70, ML 0·10, MI 20, SL 0·20, SI 57, PW 0·23, AL 0·52.

Mandible with a principal dental row of 6 enlarged teeth. Basal tooth of mandible slightly smaller than the second, following the basal lamella without a diastema. (The basal lamella partially visible as mandibles are not fully closed.) Second tooth distinctly smaller than the third and the third noticeably smaller than the fourth and fifth teeth which are the largest. Sixth tooth about the same size as the third, followed apically by a pair of denticles which share a common base. In profile the upper and lower mandibular margins divergent from base to apex, the apical (masticatory) margin a strongly downcurved arch but the mandibular dorsal border not upcurved so that it overlaps the level of the anterior clypeal margin. Anterior clypeal margin extremely shallowly concave, almost transverse in full-face view. Upper scrobe margins diverging evenly behind the relatively narrow frontal lobes, not strongly expanded, the preocular laminae just visible in full-face view. Sides of occipital lobes evenly shallowly convex behind the level of the scrobes, rounding to the occipital margin which is shallowly concave and lacks strongly prominent posteriorly projecting lobes. Eyes small, of about 10 ommatidia, situated on the ventral scrobe margin. Antennal scapes weakly clavate, broadest at about the midlength, with the leading edge shallowly convex and equipped with a number of very narrowly spatulate hairs which are subdecumbent to decumbent and directed towards the apex of the scape. Clypeal dorsum densely clothed with short spatulate appressed hairs. Behind the clypeus the hairs more narrowly spatulate and posteriorly becoming gradually even narrower so that by the level of the eye the hairs are simple. All cephalic hairs behind the clypeus are strongly arched forwards and subdecumbent to decumbent. Three pairs of long flagellate hairs present; one pair dorsally close to the occipital margin, one pair at the occipital corners and one pair at the apices of the scrobes. Clypeus smooth and highly polished, remainder of cephalic dorsum strongly reticulate-punctate. Pronotum marginate anteriorly but not laterally. Mesonotum and propodeum marginate laterally, the latter more sharply so than the former, the two areas not separated by a ridge or crest across the dorsum. In profile the dorsal alitrunk convex in outline, highest at the mesonotum and without trace of a metanotal groove, the mesonotum and propodeum forming an even shallow convexity. Propodeum with the teeth incorporated in the infradental lamella. Sides of alitrunk unsculptured except for anterior part of pronotum and some very weak peripheral vestiges. Pronotum and propodeum smooth dorsally, the mesonotum mostly smooth but with faint scattered punctures. Pronotum and mesonotum each with a pair of flagellate hairs. Otherwise dorsal alitrunk only with sparse simple hairs of varying length which arch across the dorsum or curve towards the midline and are subdecumbent to decumbent. Spongiform appendages of pedicel segments massively developed in profile. Petiole node rugulose on the

sides and dorsum, only very slightly broader than long in dorsal view and equipped with strongly prominent lateral spongiform appendages which are linked posteriorly by a broad lamina running across the posterior face of the node. Postpetiole smooth and shining, completely surrounded by spongiform tissue which is laminar anteriorly and posteriorly, thickest posterolaterally and narrowest medially. Base of first gastral tergite with a broad strongly ridged transverse band of lamellar spongiform material which has its anterior margin shallowly concave behind the posteromedian margin of the postpetiole. First gastral tergite with short basal costulae. Dorsal surfaces of petiole, postpetiole and first gastral tergite with simple fine hairs, some of those on the petiole subflagellate and others strongly back-curved. Colour black to blackish brown.

Paratype workers. TL 1·9–2·0, HL 0·49–0·53, HW 0·34–0·36, CI 67–70, ML 0·10–0·11, MI 19–21, SL 0·18–0·21, SI 53–58, PW 0·22–0·25, AL 0·52–0·55 (11 measured).

As the holotype but the basal and second teeth on the mandible may be about the same size.

Holotype worker, **Cameroun**: Nkoemvon, 2.xi.1980, N49 (*D. Jackson*) (BMNH).

Paratypes. 11 workers with same data as holotype and 1 worker with same data but 6.x.1980, N34 (partially dissected to show mandibles) (BMNH; MCZ; MHN; ENSA).

Non-paratypic material examined. **Cameroun**: nr Yaounde (*G. Terron*).

The separation of *sistrurus* and its closest relative *crypturus* from *loveridgei* is tabulated under the last name. *G. sistrurus* differs from *crypturus* as follows.

sistrurus	*crypturus*
Mandible with 6 enlarged teeth, the basalmost following the lamella without a diastema.	Mandible with 5 enlarged teeth, with a short diastema between the basalmost tooth and the lamella.
Basal tooth of mandible not followed by a long broadly spatulate medially projecting hair before the basal lamella.	Basal tooth of mandible followed by a long broadly spatulate medially projecting hair before the basal lamella.
Lateral margins of clypeus more or less parallel anterior to the frontal lobes; clypeus narrower (Fig. 24).	Lateral margins of clypeus divergent anterior to the frontal lobes; clypeus broader (Fig. 23).
Appressed spatulate hairs on clypeus relatively large, as long as or longer than the basalmost tooth of the mandible.	Appressed scale-like hairs on clypeus minute, conspicuously shorter than the basalmost tooth of the mandible.
Arched cephalic hairs at highest point of vertex simple.	Arched cephalic hairs at highest point of vertex narrowly spatulate.

The *ravidurus*-group

(Fig. 28)

Outline shape of head as Fig. 28. Mandibles with 11 teeth, the principal dental row of 6 teeth (counting from the basalmost) is followed by 2 slightly smaller teeth and an apical series of 3 denticles which share a common base. Anterior clypeal margin weakly impressed medially. Lateral clypeal margins not expanded into a convex lobe on each side, the outer margins of the mandibles at full closure intersecting the anterior clypeal margin at the anterolateral corners. Head not dorsoventrally flattened and without a posteromedian broad tumulus. Posteriorly projecting rounded occipital lobes present. Pronotum not marginate laterally, the dorsum shallowly convex. Cephalic sculpture behind the clypeus reticulate-punctate to granular, partially concealed by the pilosity. Clypeus with scale-like appressed hairs. Flagellate hairs absent.

The single species included in this group, *ravidurus* from Cameroun, combines the general appearance of the members of the *loveridgei*-group with a more generalized mandible (11 teeth as opposed to a maximum of 8 in *loveridgei* and allies), a more specialized pilosity involving the loss of flagellate hairs and development of uniform appressed scale-like hairs all over the head, and the presence of broad rounded posteriorly projecting occipital lobes. The high dental count is the same as that noted in the *thuvidus*-group but in the latter the mandibles are by no means as strikingly arched-downcurved as in *ravidurus* and the head lacks rounded occipital lobes.

Glamyromyrmex ravidurus sp. n.

(Fig. 28)

Holotype worker. TL 2·1, HL 0·54, HW 0·41, CI 76, ML 0·11, MI 20, SL 0·22, SI 54, PW 0·24, AL 0·58.

Mandible with 11 teeth following the basal lamella without a diastema, the dentition consisting of a basal series of 6 relatively large teeth followed distally by 2 slightly smaller teeth and an apical series of three denticles which share a common base (from a paratype with open mandibles). Masticatory margin obscured in dorsal view by the numerous scale-like hairs arising from the blade which project medially over the teeth. In profile the mandibles strongly arched-downcurved, the upper margin strongly curved and its highest point above the level of the anterior clypeal margin. Median portion of clypeal dorsum depressed and more or less flat, the lateral margins weakly elevated. Anterior clypeal margin very feebly indented medially, almost transverse, the lateral portions of the anterior margin slightly elevated. In full-face view the sides of the head behind the level of the antennal insertions evenly divergent to the apices of the scrobes then passing through an obtuse angle and gradually converging occipitally. Rounded posteriorly projecting occipital lobes present. Mandibles, clypeus, entire cephalic dorsum and antennal segments all with numerous conspicuous appressed scale-like hairs, without other pilosity of any description. Lateral margins of head without flagellate hairs. With head in profile the eyes very small, with only 4–5 ommatidia. Scale-like hairs present on the sides of the head behind the deep scrobes and on the preocular laminae and the lateral portion of the clypeus in front of the antennal insertions. Clypeus superficially and very faintly reticulate, the cephalic dorsum weakly reticulate-granular between the scale-like hairs. Antennal scapes weakly clavate in full-face view, broadest close to the midlength and their leading edges equipped with a series of appressed scale-like hairs which lie almost nose-to-tail, the apex of one hair nearly touching the base of the next. Pronotum marginate anteriorly but not marginate laterally. Mesonotum not marginate but the short propodeum laterally angulate between sides and dorsum; the dorsum broader than long. Metanotal groove not impressed but present across the dorsal alitrunk as a narrow transverse line. In profile the dorsal alitrunk outline more or less evenly convex, highest at about the mesonotal midlength. Propodeal teeth short, upcurved at the extreme apex, confluent ventrally with the broad infradental lamellae, the latter with their free margins more or less vertical, not evenly concave. Sides of alitrunk unsculptured, with scattered scale-like hairs on sides of pronotum. Dorsum of promesonotum with superficial faint reticular patterning and scattered appressed scale-like hairs which are similar to those on the head but narrower and in general more widely spaced. Propodeal dorsum smooth and without scale-like hairs. Flagellate hairs absent from alitrunk, without pilosity of any description other than the scale-like hairs. Pedicel segments in profile with spongiform appendages enormously developed. Petiole with ventral appendage forming a deep narrow lobe anteriorly but in its posterior half the spongiform tissue is much expanded laterally so that it is clearly visible in dorsal view. Ventral spongiform appendage of postpetiole massive and base of first gastral sternite with a well-developed spongiform pad. Petiole node in dorsal view approximately as broad as long, with a broad lamellate posterior strip. Disc of postpetiole surrounded on all sides by lamellar or spongiform material, the disc broadest in front of the midlength, the sides convergent posteriorly and the posterior margin not indented medially. Base of first gastral tergite with a lamellate spongiform strip which is traversed by the basigastral costulae, the latter very short and scarcely extending onto the tergite proper. Petiole, postpetiole and gaster unsculptured, the only pilosity present on all these surfaces being appressed scale-like hairs. Posterior margins of petiole and postpetiole with a series of large scale-like hairs which overlap the lamellar strips, these hairs much larger than those on the dorsal surfaces of the petiole and postpetiole. Colour dark brown.

Paratype worker. TL 2·1, HL 0·56, HW 0·43, CI 77, ML 0·12, MI 21, SL 0·22, SI 51, PW 0·25, AL 0·60. As holotype.

Holotype worker, **Cameroun**: nr Yaounde, sample SQ (*G. Terron*) (ENSA).

Paratypes. 1 worker, nr Yaounde, sample SV (*G. Terron*); 1 worker, nr Yaounde, sample YM (*G. Terron*) (BMNH; ENSA).

The combination of characters noted in the species-group diagnosis quickly separates *ravidurus* from all its Afrotropical congeners. The scale-like hairs on the head and body are very conspicuous and at first sight are the most obvious feature of this species. Only one other African species in the genus is similarly covered with scale-like hairs, *tukultus*, although several have appressed scale-like hairs on the clypeal dorsum alone.

The *thuvidus*-group

(Figs 29, 31)

Outline shape of head as Fig. 29. Mandibles with 11 teeth, the principal dental row containing 8 teeth of about the same size, not strikingly enlarged but larger than the three apical denticles. Mandibles not as strongly arched-downcurved as in preceding groups. Anterior clypeal margin transverse. Lateral clypeal margins not expanded into a convex lobe on each side, the outer margins of the mandibles at full closure intersecting the anterior clypeal margin at the anterolateral corners. Head not dorsoventrally flattened and without a dorsal posteromedian broad tumulus. Posteriorly projecting rounded occipital lobes absent. Pronotum not sharply marginate laterally, the dorsum transversely flat to shallowly convex. Cephalic sculpture behind the clypeus either finely granular or with coarse foveolate punctures. Clypeus usually with scale-like to spatulate hairs which are appressed, but with elevated pilosity in *trymalus*.

The three species included in this group, *thuvidus* from Kenya, *tukultus* from Ivory Coast and *trymalus* from Cameroun, are those members of *Glamyromyrmex* in Africa which seem closest to *Smithistruma*. At the start of this survey I was undecided about the correct generic assignment for these three species but, considering the appearance of the mandibles in profile (Fig. 31), I decided that *Glamyromyrmex* was the best generic fit that could be achieved at present. With the revision of the short mandibulate dacetines of the world at generic level the position of these species may change.

Although sharing the characters listed above two of the three species included here have radically different sculpture and pilosity from the third, which may not be closely related. In *tukultus* the mandibles and the entire cephalic dorsum are blanketed by appressed scale-like hairs, which partially conceal the underlying fine dense reticulate-punctate sculpture of the head. In contrast, *thuvidus* and *trymalus* lack this coat of scale-like hairs and have the cephalic dorsum coarsely foveolate, the foveolae being so strongly developed that the head has a cratered appearance.

Glamyromyrmex thuvidus sp. n.

(Fig. 31)

HOLOTYPE WORKER. TL 1·6, HL 0·43, HW 0·29, CI 67, ML 0·08, MI 19, SL 0·19, SI 66, PW 0·21, AL 0·41.

On the mandible the first tooth following the basal lamella small, about half the size of the second tooth. Remaining teeth of the principal dental row showing some slight variation in size but none radically reduced. In profile the upper and lower mandibular margins diverging from base to apex, the upper margin weakly elevated anteriorly above the level of the anterior clypeal margin; the apical (masticatory) margin arched-downcurved. Anterior clypeal margin transverse, the lateral margins not expanded, converging behind to the convex frontal lobes, the width across which, from side to side, is only slightly less than the maximum width of the clypeus. Upper scrobe margins distinctly indented behind the frontal lobes, convex and divergent posteriorly. Occipital margin shallowly concave. Eyes vestigial, consisting of only one or two ommatidia, situated on the ventral scrobe margins and the diameter of the eye less than that of the foveolate punctures which occur on the side of the head behind the scrobe. Antennal scapes very weakly clavate, the leading edges gently convex and with apically directed fine curved short hairs. Clypeus with closely appressed short spatulate to scale-like hairs. Behind the clypeus the cephalic dorsum with fine standing hairs which are arched or curved, mostly directed towards the midline; posteriorly some of the arched hairs are directed forwards. Behind the clypeus the curved hairs are narrowly spatulate, more posteriorly they are simple but some are minutely bifurcated at the apex. Sides of head with 4 pairs of laterally projecting long flagellate hairs, the occipital margin with another pair towards the outer edges but these tend to be directed upwards. Clypeus smooth and shining. Central strip of cephalic dorsum from between the frontal lobes approximately to the highest point of the vertex mostly smooth, with a few extremely minute fine rugular vestiges which are very indistinct. Dorsum behind and on each side of this area with broad coarse foveolate punctures which give the surface a cratered appearance. The head shiny and smooth between the punctures. Anterior border of pronotum marginate, the sides rounded and not marginate. Sides of mesonotum and propodeum weakly marginate, the two confluent dorsally, not separated by a transverse ridge or crest and the metanotal groove absent. Propodeal teeth mostly incorporated in the infradental lamellae, with just a minute point projecting. Sides of alitrunk smooth except for a few foveolate punctures anteriorly on the pronotum. Dorsal alitrunk smooth and shining everywhere, devoid of sculpture. Pronotum at the humeri with a pair of laterally directed long flagellate

hairs, the dorsum with two vertically directed pairs, one situated anteriorly and the other posteriorly. Mesonotum with a single flagellate pair directed vertically. Otherwise the dorsal alitrunk only with scattered fine hairs which arch towards the midline, some of these hairs minutely bifurcate apically. With the pedicel segments in profile the ventral petiolar appendage reduced to an anteriorly situated broad lobe beneath the peduncle, the lobe petering out about on a level with the highest point of the node. Lateral and ventral appendages of postpetiole large but delicate and blister-like, translucent and with minute weak veins present. Petiole in dorsal view with the node transverse, much broader than long, smooth and shining. Lateral spongiform appendages vestigial, reduced to a minute and scarcely visible strip on each side, without a transverse lamella connecting them across the posterior face of the node. Postpetiole in dorsal view smooth and shining, the blister-like appendages prominent on each side and the anteriormost parts of the ventral appendage visible, projecting in front of the anterior margin of the lateral appendage on each side. Anterior and posterior margins of postpetiolar disc bordered by a narrow lamella, the disc itself roughly trapezoidal in shape, narrowing posteriorly and with broadly rounded anterolateral corners, the anterior margin deeply concave. Base of first gastral tergite lamellar, the lamella deeply concave and almost interrupted medially. Basigastral costulae arise on each side of this concavity. Dorsal surfaces of petiole, postpetiole and first gastral tergite each with scattered fine simple hairs which are mostly erect to suberect. Colour glossy dull yellow.

Paratype worker. TL 1·6, HL 0·44, HW 0·29, CI 66, ML 0·09, MI 20, SL 0·20, SI 69, PW 0·22, AL 0·43. As holotype.

Holotype worker, **Kenya**: Embu, Kirimiri Forest, W. of Runyenje, 1550 m, 3.x.1977 (*V. Mahnert & J.-L. Perret*) (MHN).
Paratype. 1 worker with same data as holotype (BMNH).

G. thuvidus and *trymalus* are closely related and together are separated from *tukultus* as tabulated below. Differences between *thuvidus* and *trymalus* are given under the latter.

thuvidus and *trymalus*	*tukultus*
Mandibles not clothed in scale-like hairs.	Mandible clothed in scale-like hairs.
Cephalic dorsum behind clypeus with arched simple hairs, and with flagellate hairs present (5 pairs).	Cephalic dorsum behind clypeus with appressed scale-like hairs; flagellate hairs absent.
Sides of pronotum with a few anteriorly situated foveolate punctures.	Sides of pronotum unsculptured.
Ventral appendage of petiole lobiform, not running the length of the segment.	Ventral appendage of petiole massively spongiform, running the length of segment.
Petiole node much broader than long in dorsal view, the posterior margin without a transverse bordering lamella.	Petiole node about as broad as long in dorsal view, the posterior margin with a broad transverse bordering lamella.
Anterior margin of postpetiolar disc concave in dorsal view.	Anterior margin of postpetiolar disc transverse in dorsal view.

Glamyromyrmex trymalus sp. n.

Holotype worker. TL 1·7, HL 0·43, HW 0·30, CI 70, ML 0·10, MI 23, (antennae lost), PW 0·22, AL 0·44.

Extremely closely related to *thuvidus* and answering to the description given for that species. In particular, *trymalus* shows the same highly characteristic cephalic sculpture as *thuvidus*, having numerous broad foveolate punctures with smooth spaces between them so that the head appears cratered. This very distinctive sculpture coupled with minute size, yellow colour, and the characters noted in the species-group diagnosis serve to isolate *thuvidus* and *trymalus* from all other Afrotropical *Glamyromyrmex*. The two are separated as follows.

thuvidus	*trymalus*
Clypeal dorsum with appressed short scale-like to spatulate hairs.	Clypeal dorsum without appressed hairs of any description.

thuvidus – cont.	*trymalus – cont.*
Elevated relatively long hairs absent from clypeal dorsum.	Elevated relatively long hairs present on clypeal dorsum.
Lateral and ventral appendages of postpetiole delicate and blister-like, translucent and with minute veins present.	Lateral and ventral appendages of postpetiole conspicuously spongiform.
With postpetiole in dorsal view the anterior margin of the disc broadly and deeply concave.	With postpetiole in dorsal view the anterior margin of the disc evenly shallowly concave.
Basalmost tooth of mandible only half the size of the second tooth from the base.	Basalmost tooth of mandible only very slightly smaller than the second tooth from the base.

Holotype worker, **Cameroun**: nr Yaounde, sample AAU (*G. Terron*) (ENSA).

Glamyromyrmex tukultus sp. n.

(Fig. 29)

HOLOTYPE WORKER. TL 1·6, HL 0·41, HW 0·29, CI 71, ML 0·10, MI 24, SL 0·16, SI 55, PW 0·20, AL 0·44.

Mandibles covered in small scale-like appressed hairs. Basalmost tooth following the basal lamella without a diastema, slightly smaller than the second tooth; all teeth after the second approximately the same size except teeth nine and ten which are much reduced. There is a tendency for alternating slightly smaller and slightly larger teeth in the principal dental row. In profile the mandibles broadening from base to apex, the upper margin not conspicuously raised above the level of the anterior clypeal margin and with a plateau-like slightly convex outline before arching steeply downwards. Anterior clypeal margin transverse. Frontal lobes not distinctly convex, their margins more or less parallel, the width across the frontal lobes from edge to edge conspicuously less than the maximum width of the clypeus; the preocular laminae plainly visible in full-face view. Sides of head behind the frontal lobes shallowly convex and divergent. Occipital margin evenly concave. Eyes small, situated on the ventral margin of the short but deep antennal scrobe. Antennal scapes in full-face view with the leading edges moderately convex but distinctly indented near the base, without projecting hairs but equipped with appressed small scale-like hairs which are also present on the funicular segments. Clypeus and entire dorsum of head densely clothed with appressed scale-like hairs which are directed anteriorly, the hairs situated more posteriorly on the head narrower and more spatulate than those sited further forwards. Head without other pilosity of any description. Clypeus smooth, the cephalic dorsum behind the clypeus finely reticulate-punctate but the sculpture largely concealed by the pilosity. Anterior pronotal border marginate, the sides not marginate. Sides of mesonotum extremely feebly marginate and sides of propodeum slightly more strongly so, the two segments confluent on the dorsum, not separated by a transverse ridge or crest; the metanotal groove absent. Propodeal teeth entirely incorporated in the infradental lamellae. Sides of alitrunk unsculptured and shining. Dorsal alitrunk smooth and shining everywhere. Pronotum with three pairs of short erect simple hairs, one pair at the humeri, one pair anterodorsally and another posterodorsally; mesonotum with a single pair of short erect hairs. Apart from these the dorsal alitrunk with decumbent to appressed small hairs which are directed towards the midline; those on the pronotum narrowly spatulate. In profile the spongiform appendages of the pedicel segments massively developed, the petiolar ventral appendage running the length of the segment, finely and densely spongiform and almost as deep as the maximum height of the node. Lateral and ventral postpetiolar appendages thick and the basisternal pad on the gaster conspicuous. Petiole node in dorsal view smooth, about as long as broad and with sharply defined anterior and posterior borders. Lamellate appendage of node continuous across the posterior margin. Disc of postpetiole smooth and shining, much broader than long and thickly surrounded at the sides by dense spongiform tissue, a lobe of which projects strongly forwards from below the disc on each side of the petiole-postpetiole junction. Anterior border of postpetiolar disc with a narrow lamellate margin. Base of first gastral tergite with a thick costulate-spongiform transverse strip, the anterior margin of which is very feebly concave medially. Basigastral costulae mostly confined to this strip, only feebly encroaching onto the tergite proper at the sides. Petiole, postpetiole and gaster with fine simple hairs, the first also with a few narrowly spatulate reclinate hairs. Colour glossy dull yellow.

PARATYPE WORKERS. TL 1·6, HL 0·42, HW 0·29–0·30, CI 69–71, ML 0·10, MI 24, SL 0·16–0·17, SI 55–59, PW 0·20, AL 0·44 (3 measured).

As holotype but infradental lamellae may have a point developed apically.

Holotype worker, **Ivory Coast**: Bingerville, 29.x.1980 (*V. Mahnert & J.-L. Perret*) (MHN).
Paratypes. 3 workers with same data as holotype (MHN; BMNH; MCZ).

Closest related to *thuvidus*, differences separating the species are tabulated under that name. The most obvious character separating *tukultus* from all other members of the genus except *ravidurus* is the dense covering of scale-like hairs everywhere on the head and its appendages. *G. ravidurus* is a much larger darker species than *tukultus* and the characters given in their respective species-group diagnoses will differentiate the two.

SERRASTRUMA Brown

(Figs 34–44)

Serrastruma Brown, 1948: 107 [as subgenus of *Smithistruma*]. Type-species: *Strumigenys simoni* Emery, 1895*a*: 42, pl. 2, fig. 21, by original designation.
Serrastruma Brown; Brown, 1949*a*: 6. [Raised to genus.]

Diagnosis of worker. Afrotropical dacetine ants. Mandibles elongate-triangular (MI 26–50), serially finely and densely denticulate along the entire masticatory margin, with >20 denticles; without an apical fork of spiniform teeth. Mandibular denticles either uniformly small or with the basal 4–8 enlarged, commonly the basalmost denticles enlarged in either case. Mandibles lacking a differentiated prominent basal lamella and shallowly curved in profile. Antennae with 6 segments.

All 11 presently recognized species of *Serrastruma* are found in sub-Saharan Africa. Most are restricted to that region but a couple of species (*ludovici* and *simoni*) have successfully invaded the Malagasy region. Three species (*lujae, serrula* and *maynei*) have been found on the islands in the Gulf of Guinea. All nest in rotten wood, in the leaf litter or topsoil layer, or in the stumps of trees. Foraging is mainly conducted in the leaf litter or topsoil layers but individuals may ascend bushes and trees to a height of a metre or more, and *maynei* may form nests in trunks some distance above the ground. The predatory behaviour of *S. serrula* has been investigated in some detail by Dejean (1980*a*; 1980*b*).

The genus *Serrastruma* has its origins in *Smithistruma*, being derived and differentiated from that genus by the specialized form of the mandibles in *Serrastruma*. Brown (1952*a*: 71) has postulated an origin for *Serrastruma* in the *Smithistruma alberti*-group or *capitata*-group and maintains that the elongate basal lamella of the mandible seen in these groups has in *Serrastruma* become denticulate all along its inner free margin and has been pressed into service as part of the masticatory surface, the original smithistrumiform dentition being represented only by the apical group of denticles in *Serrastruma* and most of the length of the mandible being represented by this secondary development. This explanation effectively accounts for the mandibular form and dentition seen in *Serrastruma* and also accounts for the lack of a differentiated basal lamella in the genus, the presence of which is characteristic of *Smithistruma* and all its close relatives. The differences in mandibular form between *Serrastruma* and *Smithistruma* in the Afrotropical fauna may be tabulated as follows.

Serrastruma	*Smithistruma*
Mandibles elongate triangular, relatively long, MI 26–50.	Mandibles triangular to subtriangular, relatively short, MI 7–20.
Mandibles without a differentiated projecting basal lamella.	Mandibles with a differentiated projecting basal lamella (usually concealed by clypeus when closed).
Masticatory margin of mandible with >20 (usually at least 30) fine small denticles, sometimes with the basal 4–8 enlarged, often with the basalmost enlarged.	Masticatory margin of mandibles usually with 12 teeth or denticles, in one species with 16–17, the basal 5–7 of which form the principal dental row.

Serrastruma – cont.
Base of mandibles not extensively overlapped by the clypeus in full-face view, the latter with a false anterior margin above the true margin.

Smithistruma – cont.
Base of mandibles extensively overlapped by the clypeus in full-face view, the latter lacking a false anterior margin above the true margin.

Historically *Serrastruma* dates back only to 1948 when Brown first defined the group as a subgenus of *Smithistruma*. Prior to that date the members of *Serrastruma* had been treated either as belonging to *Strumigenys* (Arnold, 1917) or grouped together with *Smithistruma* in a subgenus of *Strumigenys* called *Cephaloxys* (Wheeler, 1922). Brown (1948) showed that several disparate groups were included in *Strumigenys*. He erected the genus *Smithistruma* to hold most of the short-mandibulate forms previously included in *Strumigenys* (the name *Cephaloxys* being preoccupied) and treated *Serrastruma* as a subgenus of *Smithistruma*. The next year Brown (1949*a*) recognized that *Serrastruma* and *Smithistruma* had differently constructed mandibles and raised the former name to full generic status.

Subsequently Brown (1952*a*) issued an extensive revision of *Serrastruma* which cut down the 27 named forms then in the genus to seven recognized species plus two species inquirendae. Since the publication of this revision much type-material unobtainable by Brown has become available for study, along with a great many more samples of *Serrastruma*, all of which has greatly facilitated the present investigation. Fundamentally Brown's treatment of the genus remains unchanged except for the addition of five new species and a reinterpretation of a few names, most of these belonging to forms where the type-series was not available to Brown while conducting his survey. The changes from his revision are summarized as follows. Brown's (1952*a*: 85) species inquirendae included the names *ludovici* and *calypso*. The types of these were not available for his study but he speculated that *ludovici* was the senior synonym of *alluaudi*. Brown has informed me that he confirmed this synonymy some time ago and my examination of the types agrees with his conclusion. As for *calypso*, Brown supposed it might be synonymous with *lotti*. However, an examination of the holotype, which was not available for study at the time of Brown's revision, shows it to be a straight synonym of *lujae*.

S. lotti and *bequaerti*, treated by Brown (1952*a*: 76, 80) as valid species, are now included as synonyms of *ludovici* and *lujae* respectively. Some time ago Brown informed me that he had recognized both these synonyms, and I have merely confirmed them here.

S. alluaudi st. *nigeriensis* was given by Brown (1952*a*: 83) as a synonym of *simoni* but a re-examination of the mandibles of the syntype-series has revealed the characteristic dentition of *ludovici*, and *nigeriensis* has now been referred to the synonymy of *ludovici*.

Brown (1952*a*: 75) recognized that the type-series of *raymondi* was a mixture of *alluaudi* (now *ludovici*) and *simoni*, and synonymized *raymondi* under the former name. However, the specimen labelled as holotype by Donisthorpe, the author of *raymondi*, is plainly a specimen of *simoni*, and *raymondi* is therefore transferred to the synonymy of that species.

Finally *concolor* is removed from the synonymy of *serrula* and reinstated as a valid species, for reasons given in the discussion of *concolor*, below.

In terms of number of species *Serrastruma* falls well behind *Smithistruma* and *Strumigenys*, but in terms of numbers of individuals and the range of distribution of the species *Serrastruma* far outstrips the rest. Its species are easily the most successful dacetine ants in sub-Saharan Africa and in terms of number of samples encountered in collections *Serrastruma* material amounts to more than that of all the other genera combined. It is this commonness, coupled with an innate tendency of the most widely distributed species to show variation in sculpture and size, which has been mostly responsible for the extensive synonymy.

List of Afrotropical *Serrastruma*

concolor (Santschi) **sp. rev.**
dotaja **sp. n.**
geoterra **sp. n.**
inquilina **sp. n.**
ludovici (Forel)
  alluaudi Santschi **syn. n.**
  alluaudi st. *nigeriensis* Santschi **syn. n.**
  rothkirchi Wasmann
  escherichi subsp. *lotti* Weber **syn. n.**

lujae (Forel)
reticulata Stitz
glanduscula Santschi
bequaerti Santschi **syn. n.**
gerardi Santschi
calypso Santschi **syn. n.**
aequalis Menozzi
maynei (Forel)
maynei var. *latiuscula* Forel
***miccata* sp. n.**
serrula (Santschi)
uelensis Santschi
simoni (Emery)
escherichi Forel
cognata Santschi
biconvexa Santschi
cognata st. *boerorum* Santschi
escherichi r. *limbata* Forel
escherichi var. *cliens* Forel
escherichi st. *cognata* var. *obscuriventris* Santschi (unavailable)
escherichi st. *cognata* var. *fusciventris* Santschi (unavailable)
raymondi Donisthorpe **syn. n.**
***sulumana* sp. n.**

Key to species (workers)

Note. The parasitic *S. inquilina,* known only from a series of females found in a nest of *lujae*, is omitted from the key.

1 With the head in full-face view the upper scrobe margin just behind the level of the eyes without a projecting long hair on each side 2

– With the head in full-face view the upper scrobe margin just behind the level of the eyes with a long flagellate or simple fine hair projecting on each side 5

2 Dorsal surfaces of head and alitrunk with very conspicuous dense thickly spatulate to scale-like coarse ground-pilosity (Figs 36, 37). Antennal scapes relatively short, SI 73–83 3

– Dorsal surfaces of head and alitrunk with inconspicuous slender very narrowly spatulate ground-pilosity. Antennal scapes relatively long, SI 116–127 4

3 Dorsal alitrunk sculptured. Sides of head not broadly convex posteriorly (Fig. 37). (Ivory Coast, Ghana, Nigeria, Cameroun, Annobon I., Zaire, Angola, Uganda, Tanzania) ***maynei*** (p. 347)

– Dorsal alitrunk glassy smooth. Sides of head broadly convex posteriorly (Fig. 36). (Cameroun) ***geoterra*** (p. 341)

4 Pronotal humeri each with a short stout clavate hair. Leading edges of scapes with projecting short clavate hairs. Mandibles shorter, MI 26, the basal 4–5 denticles suddenly and conspicuously enlarged. Metanotal groove not impressed. (Ghana) .... ***miccata*** (p. 348)

– Pronotal humeri each with a long fine flagellate hair. Leading edges of scapes with fine simple outcurved short hairs. Mandibles longer, MI 44–45, the basal 4–5 denticles not enlarged. Metanotal groove impressed. (Cameroun) .... ***sulumana*** (p. 352)

5 Principal sculpture of pronotal dorsum dense reticulate-punctation, with or without overlying costulate or striate sculpture. When such overlying sculpture is present it is distinctly secondary to the dense punctate component 6

– Principal sculpture of pronotal dorsum consisting of longitudinal to oblique striae or costulae, or the surface mostly to entirely unsculptured and smooth; punctate sculpture usually absent but when present is very feeble and distinctly secondary to the striate or costulate component 9

6 With the head in full-face view the basal series of denticles on the mandible suddenly enlarged, broader longer and coarser than those preceding; usually this enlarged series very distinct (Fig. 34). (Extremely widespread in Afrotropical region, Madagascar, Mauritius) ***ludovici*** (part, p. 343)

– With the head in full-face view the basal series of denticles on the mandible not enlarged, the denticles approximately the same size throughout the length of the margin or very evenly and gradually increasing in size basally 7

7 Mesonotum with 3–4 pairs of short erect relatively slender hairs, the posteriormost pair situated at or close to the metanotal groove. Ground-pilosity of promesonotum strong, not reclinate, conspicuous in profile (Fig. 42). Punctate sculpture of head and alitrunk strong and sharply defined. (West and central Africa, São Tomé I.) .... ***serrula*** (p. 349)

– Mesonotum usually with a single pair of erect apically thickened to strongly clavate hairs which are situated anteriorly on the segment. Very rarely a second pair present but if so these are close to the first pair and remote from the metanotal groove. Ground-pilosity of promesonotum feeble, mostly or entirely reclinate, inconspicuous in profile (Figs 43, 44). Punctate sculpture on head and alitrunk usually fine 8

8 Dorsum of head behind highest point of vertex with 4 relatively slender simple standing hairs and with a further pair situated in front of the highest point of the vertex. With the head in full-face view the upper scrobe margins not indented at the site of the projecting hair. Postpetiole with more than one pair of standing hairs. (Extremely widespread in Afrotropical region) .... ***lujae*** (p. 345)

– Dorsum of head behind highest point of vertex with 2–4 thickened apically clavate standing hairs; without standing pilosity in front of the highest point of the vertex. With the head in full-face view the upper scrobe margins usually conspicuously indented at the site of the projecting hair. Postpetiole with only a single pair of standing hairs. (West and Central Africa, Uganda) .... ***concolor*** (p. 338)

9 Pronotum (at the humeri) and mesonotum each with a pair of exceptionally long fine flagellate hairs (Fig. 38). First gastral tergite with only a single pair of long simple hairs, which are not thickened or clavate apically and are situated close to the base of the sclerite. (Cameroun, Gabon) .... ***dotaja*** (p. 339)

– Pronotum (at the humeri) with flagellate hairs but mesonotum never with such hairs. Usually the mesonotum with a single pair (very rarely 2 pairs) of stout hairs which are thickened or clavate apically (Figs 40, 41). First gastral tergite with hairs present which are thickened or clavate apically 10

10 Basal series of mandibular denticles suddenly and conspicuously enlarged (Fig. 34). With postpetiole in profile the area of the ventral spongiform lobe less than that of the exposed portion of the postpetiolar disc (Fig. 41). (Extremely widespread in Afrotropical region, Madagascar, Mauritius) .... ***ludovici*** (part, p. 343)

– Mandibular denticles small fine and regular to base. With postpetiole in profile the area of the ventral spongiform lobe distinctly greater than that of the exposed portion of the postpetiolar disc (Fig. 40). (Eastern and southern Africa, Nigeria, Mauritius) .... ***simoni*** (p. 350)

Serrastruma concolor (Santschi) **sp. rev.**

(Fig. 43)

Strumigenys (Trichoscapa) concolor Santschi, 1914*b*: 375. Syntype workers, female, GHANA: Aburi (NMB) [examined]. [Previously synonymized with *serrula* by Brown, 1952*a*: 81.]

WORKER. TL 2·0–2·2, HL 0·48–0·52. HW 0·40–0·46, CI 80–90, ML 0·16–0·18, MI 32–36, SL 0·30–0·33, SI 67–80, PW 0·28–0·32, AL 0·56–0·62 (12 measured).

Mandibular denticles evenly sized to the base, without a basal series of 4–8 denticles which are enlarged though the basalmost may be larger than those preceding. Upper scrobe margins well developed, with a flagellate hair at each side just behind the level of the eye and with the margin indented or impressed at the site of the hair. Width and depth of this indentation variable, usually conspicuous in full-face view but sometimes only shallow. Ground-pilosity of head short and narrowly spatulate, closely applied to the surface and indistinct. Dorsum of head behind highest point of vertex with 2 or 4 elongate standing hairs which are anteriorly curved, stout and narrowly clavate apically. Samples with only one pair of these hairs generally have the upper scrobe margins more strongly impressed at the site of the flagellate hair than do those samples with two pairs of hairs. Entire dorsum of head densely finely reticulate-punctate. Alitrunk in profile with promesonotum convex, sloping down posteriorly to the impressed metanotal groove. Propodeal dorsum convex, sloping behind to a pair of teeth which are variable in size. Infradental lamellae present on propodeal declivity. Sides of pronotum superficially punctulate to smooth, the pleurae usually smooth but in some their upper halves finely punctulate. Dorsal alitrunk finely reticulate-punctate everywhere but the intensity of sculpture on the pronotum variable and sometimes the punctures filled by a waxy superficial layer. Occasionally weak superficial rugulae, generally formed by alignment of puncture margins, may occur, but these are always distinctly secondary to the punctate sculpture. Pronotum with flagellate hairs present at the humeri. Mesonotum with a single anteriorly situated pair of standing hairs which are stout long conspicuous and clavate apically. Dorsal alitrunk otherwise only with sparse ground-pilosity which is short, inconspicuous and generally closely applied to the surface. Spongiform appendages of pedicel segments moderately developed in profile. Petiole in dorsal view usually punctate but the sculpture very faint in some specimens. Postpetiole usually superficially punctulate but almost smooth in some, with a posterior spongiform strip which abuts a similar narrow strip on the base of the first gastral tergite. Basigastral costulae present, the tergite otherwise unsculptured. Petiole and postpetiole dorsally each with a single pair of elongate stout hairs which are clavate apically, the first gastral tergite with numerous similar hairs. Colour yellow to yellowish brown.

This small species was earlier treated as a synonym of *serrula* by Brown (1952*a*: 81), but on examining the numerous series assigned to *serrula* it became apparent that two distinct species were in fact present. One of these matched the holotype of *serrula* (= *uelensis*) and the other the type-series of *concolor*, which is therefore returned to species rank. The two are separated by the following characters in the worker.

concolor (Fig. 43)	*serrula* (Fig. 42)
Mesonotum with a single anteriorly situated pair of elongate stout apically clavate standing hairs.	Mesonotum with 3 (rarely 4) pairs of more slender standing hairs which are weakly or scarcely clavate, the posteriormost pair the shortest and situated at the metanotal groove.
Petiole and postpetiole each with only a single pair of standing hairs.	Petiole usually and postpetiole always with more than one pair of standing hairs.
Ground-pilosity of head and alitrunk short sparse and inconspicuous, closely applied to the surface; the standing hairs on the cephalic dorsum very obviously longer and stouter than the ground-pilosity.	Ground-pilosity of head and alitrunk moderately long and dense, very conspicuous and elevated; the standing hairs on the cephalic dorsum only slightly longer and stouter than the ground-pilosity.
Alitrunk pleurae unsculptured at least on lower halves.	Alitrunk pleurae punctate but sometimes only superficially so.
Punctate sculpture of pronotal dorsum fine and not sharply defined.	Punctate sculpture of pronotal dorsum strong and sharply defined.

One other species is close to *concolor*, the common *lujae*, a species that shows a remarkable size range but whose diagnostic characters remain quite stable. *S. concolor* is persistently small, overlapping only the lower end of the range of *lujae*, and it differs by having 2–4 standing hairs posteriorly on the cephalic dorsum which are distinctly clavate apically, as opposed to the 6 fine hairs on the cephalic dorsum in *lujae* which are scarcely or not at all swollen apically. In *lujae* the 6 hairs are arranged in a posterior row of 4 and an anterior pair, situated just in front of the highest point of the vertex. The postpetiole in *concolor* always bears a single pair of stout hairs; in *lujae* two or more pairs occur.

I consider it possible that *concolor*, as presently constituted, may consist of two sibling species. It is noticeable that the samples with a single pair of standing cephalic hairs have the upper scrobe margins more strongly impressed at the site of the projecting hair than do those with two pairs of standing hairs. Whatever significance this may have cannot be investigated at the present time as not enough material of the two forms is available for comparison.

MATERIAL EXAMINED

Ivory Coast: Man (*V. Mahnert & J.-L. Perret*); Sassandra (*I. Löbl*). **Ghana**: Mampong (*P. Room*); Aburi. **Cameroun**: Mt Cameroun, Buea slope (*B. Malkin*); nr Yaounde (*G. Terron*). **Gabon**: Plateau d'Ipassa (*J. A. Barra*). **Zaire**: Ituri Forest, Beni Irumu (*N. A. Weber*); Ituri Forest, Epulu (*T. Gregg*); Niangara (*N. A. Weber*); Ruwenzori, Mwenda (*J. C. Bradley*). **Angola**: R. Camudembele (*L. de Carvalho*); R. Mussungue (*L. de Carvalho*); Dundo; Gubela (*P. Hammond*). **Chad**: Haut Mbomu (*N. A. Weber*). **Uganda**: Ft Portal (*N. A. Weber*).

Serrastruma dotaja **sp. n.**

(Figs 35, 38)

HOLOTYPE WORKER. TL 2·3, HL 0·53, HW 0·42, CI 79, ML 0·22, MI 42, SL 0·36, SI 86, PW 0·32, AL 0·62.

Mandibular denticles small even and regular, without a basal series of 4–8 enlarged denticles; only the basalmost denticle enlarged. Upper scrobe margins narrow and petering out posteriorly, not composed of a broad continuous lamellate granular flange; equipped just behind the level of the eye with an extremely long flagellate hair which basally projects laterally from the margin. Clypeus smooth on the disc, with appressed small spatulate hairs, the anteriormost row of spatulate hairs situated on the false margin of the clypeus and freely projecting forwards over the mandibular bases. Ground-pilosity of head to highest point of vertex consisting only of sparse narrow inconspicuous hairs which are decumbent to appressed and

directed anteriorly. Dorsum of head behind highest point of vertex with similar but slightly longer ground-pilosity and also with two pairs of anteriorly curved long simple hairs, one pair situated just behind the highest point and the other latero-occipitally. Dorsum and sides of head densely and strongly reticulate-punctate everywhere. Pronotum marginate anteriorly but laterally the sides of the alitrunk separated from the dorsum only by smoothly rounded blunt angles. In profile the pronotum and anterior part of the mesonotum forming an even shallow convexity, the posterior part of the mesonotum sloping down to the shallowly impressed metanotal groove. Propodeal dorsum curving down posteriorly to the bases of the strong propodeal teeth which are elevated and slightly upcurved. Infradental lamellae present down the depth of the propodeal declivity, its width equal to or slightly greater than the diameter of the propodeal spiracle. Sides of alitrunk glassy smooth, devoid of sculpture. Dorsal surfaces of pronotum, anterior mesonotum and propodeum glassy smooth. Posterior (sloping) portion of mesonotum smooth centrally but with some weak lateral punctulae and posteriorly with some irregular sculpture just in front of the metanotal groove. Propodeal declivity reticulate-punctate between the bases of the teeth. Pronotum and mesonotum each equipped with a pair of extremely long fine flagellate hairs, each hair arising from a small papilla. Dorsum of promesonotum otherwise only with very sparse short ground-pilosity which is subdecumbent. With the pedicel segments in profile the spongiform appendages well developed. Ventral petiolar process spongiform posteriorly but more solid and opaque anteriorly. Ventral and lateral spongiform lobes of postpetiole about equal in size, lateral appendage of petiole node smaller. In dorsal view both petiole and postpetiole smooth and very shiny, the former with a distinct spongiform strip running across the posterior face. Disc of postpetiole transversely roughly oval in dorsal view, the anterior face with a narrow transverse lamellate strip, the sides bordered with spongiform material which becomes broader posteriorly, and the posterior margin bordered with a broad spongiform strip the posterior margin of which is shallowly concave medially. Extreme base of first gastral tergite lamellate spongiform, with a continuous band of short basigastral costulae which do not run further back than the pair of long gastral hairs; remainder of tergite glassy smooth. Petiole and postpetiole each with a single pair of stout simple posteriorly curved long hairs. First gastral tergite with a single pair of simple hairs which are situated close to the base of the sclerite. Colour jet black, glossy behind the head, the appendages brown.

Paratype workers. TL 2·3–2·5, HL 0·50–0·54, HW 0·41–0·43, CI 78–82, ML 0·20–0·23, MI 38–43, SL 0·34–0·37, SI 81–88, PW 0·31–0·34, AL 0·60–0·66 (20 measured).

As holotype but specimens from Gabon are slightly lighter in colour, blackish brown with somewhat lighter pedicel segments.

Holotype worker, **Cameroun**: Nkoemvon, 16.iii.1980 (*D. Jackson*) (BMNH).

Paratypes. **Cameroun**: 12 workers with same data as holotype; 3 workers with same data but 25.xi.1980, N52. **Gabon:** 11 workers, Plateau d'Ipassa, 6, IPA CI9 (*J. A. Barra*); 1 worker with same data but IVI5, IPA 8 (BMNH; MCZ; MHN).

Non-paratypic material examined. **Cameroun**: nr Yaounde (*G. Terron*).

The presence of very long fine flagellate hairs on the mesonotum as well as on the pronotum immediately distinguishes *dotaja* from all other species as in those the mesonotum has one or more pairs of stout hairs which are thickened or clavate apically. The species *lujae, serrula, concolor* and *maynei* are also distinguished from *dotaja* by their possession of conspicuous pronotal sculpture, and *maynei, sulumana* and *geoterra* lack cephalic flagellate hairs. From *ludovici* samples in which the enlarged basal series of mandibular denticles is not very strongly developed *dotaja* differs in having the pleurae and propodeal dorsum smooth, as well as by having simple cephalic, petiolar, postpetiolar and gastral pilosity, all of which are clavate in *ludovici*. *S. simoni*, the closest relative of *dotaja*, is separated as follows.

dotaja (Fig. 38)	*simoni* (Fig. 40)
Standing hairs behind highest point of cephalic vertex simple.	Standing hairs behind highest point of cephalic vertex clavate.
Mesonotum with a pair of very long flagellate hairs similar to those on the pronotum.	Mesonotum with a pair of stout clavate hairs contrasting with the flagellate hairs on the pronotum.
Pilosity of petiole, postpetiole and gaster each of a single pair of simple curved hairs.	Pilosity of petiole, postpetiole and gaster each of one or more pairs of clavate hairs.
Pronotal dorsum glassy smooth.	Pronotal dorsum at least with scattered vestiges of sculpture.

dotaja (Fig. 38) – *cont.*	*simoni* (Fig. 40) – *cont.*
Dorsum of propodeum and of petiole node glassy smooth.	Dorsum of propodeum punctate, very very rarely with a smooth median area; petiole node punctate dorsally even if only feebly so.
Disc of clypeus smooth (when clean).	Disc of clypeus sculptured (when clean).
MI 38–43; ML is 0·48–0·53×HW.	MI 33–39; ML is 0·42–0·48×HW.

A single worker of *simoni* from Burundi (in MCZ) with very reduced sculpture is responsible for the qualifying 'at least' and 'very rarely' in the sculpture characters listed above. In this specimen the sculpture is more reduced than is usual in *simoni* and it is more like *dotaja* in this respect than any other sample examined. However, even in this individual the pilosity characters are absolutely those of *simoni*.

Serrastruma geoterra sp. n.

(Fig. 36)

Holotype worker. TL 2·6, HL 0·58, HW 0·52, CI 90, ML 0·23, MI 40, SL 0·38, SI 73, PW 0·34, AL 0·74.

Mandibles with denticles very slightly enlarging basally, the increase in size minute and gradual, without a suddenly much enlarged basal series. False anterior margin of clypeus with a row of very conspicuous broad flattened hairs which project straight forwards over the real clypeal margin and the bases of the mandibles. Upper scrobe margins expanded into a very broad conspicuous lamella which runs the length of the scrobe, is slightly elevated and is of approximately equal width throughout its length. This upper scrobal lamella is so broad posteriorly that the eyes are concealed and not visible in full-face view; the margin without a pair of projecting long hairs just behind the level of the eyes. Antennal scapes feebly curved, broadened after the basal third and narrowing again apically, their leading edges with a projecting row of short broad flattened hairs which are truncated apically. Ground-pilosity of head consisting everywhere of very thick short blunt off-white to yellowish hairs which in profile can be seen to be dorsoventrally flattened and strongly curved anteriorly. Close to the occipital margin is a single pair of similarly constructed but longer, slightly more erect hairs. Eyes small, of 5–6 ommatidia. Clypeus with very feeble superficial reticular sculpture, a narrow strip behind the clypeus and following the shape of the posterior clypeal margin depressed and smooth. Behind this the head weakly reticulate-punctate, this sculpture fading posteriorly and the area between the highest point of the vertex and the occipital margin smooth except for the pits from which the hairs arise. Broad flange of upper scrobe margin densely reticulate-granular. Pronotum not marginate laterally, the humeri without flagellate hairs. Pronotum in dorsal view almost twice wider than the mesonotum, the two separated by a shallow arched-transverse impression. Metanotal groove represented by a transverse line across the dorsum but not impressed. With the alitrunk in profile the pronotal outline separated by a shallow impression from the mesonotum, the anterior half of the latter raised and on the same level as the pronotum. Behind this the mesonotum descending almost vertically and its posterior half flat or shallowly concave to the level of the metanotal groove, behind which the propodeal dorsum is shallowly convex and sloping posteriorly. Propodeal teeth triangular, with a narrow but conspicuous infradental lamella. Dorsum and sides of alitrunk glassy smooth everywhere, the propodeal declivity with reticular vestiges on its upper half. Pilosity of dorsal alitrunk as on head, the hairs curved anteriorly or medially on the pronotum and mesonotum, posteriorly on the propodeum. Mesonotum with a pair of similarly constructed but larger hairs at the point where the surface begins its sudden descent. Spongiform appendages of pedicel segments small, the subpetiolar process reduced to a thin strip and the subpostpetiolar lobe much smaller than the exposed area of the postpetiolar disc in profile. Dorsum of petiole node smooth but the peduncle and sides reticulate; posterior spongiform strip of node lamellate and narrow. Postpetiole smooth in dorsal view, posteriorly with a thin spongiform strip which abuts a similar thin strip on the base of the first gastral tergite. Basigastral costulae very short, no longer on the tergite than the width of basal spongiform strip; gaster otherwise smooth. Dorsal surfaces of petiole, postpetiole and gaster with ground-pilosity similar to that described for the head, and with paired longer more erect hairs which are thick, sturdy and broadly clavate. Colour glossy brown, the legs with dense scale-like decumbent to appressed pilosity.

Paratype worker. TL 2·7, HL 0·60, HW 0·54, CI 90, ML 0·23, MI 38, SL 0·40, SI 74, PW 0·37, AL 0·75. As holotype.

Holotype worker, **Cameroun**: nr Yaounde, sample 2513 (*G. Terron*) (ENSA).

Paratype. 1 worker with same data but sample TS (BMNH).

This very distinctive species appears closest related to *maynei*, the two having broad upper scrobe margins, conspicuous cephalic ground-pilosity, lacking flagellate hairs on the head and pronotum, lacking dense punctate pronotal sculpture, and having antennal scapes of moderate length. They are easily separated as *geoterra* has the alitrunk absolutely smooth whilst in *maynei* sculpture is present. Apart from this the alitrunk is characteristically shaped in *geoterra*, the cephalic pilosity is even broader and coarser than in *maynei*, and the sides of the head are conspicuously more convex because of the wide upper scrobe margin in *geoterra*, compare Figs 36, 37.

Serrastruma inquilina sp. n.

Holotype female. TL 3·0, HL 0·65, HW 0·48, CI 74, ML 0·22, MI 34, SL 0·52, SI 108, PW 0·48, AL 0·80.

Mandibular denticles very gradually increasing in size towards base. Antennal scrobes vestigial, the upper scrobe margins not differentiated behind the level of the anterior margin of the eye; behind this point the dorsum of the head rounding into the sides. Flagellate hairs absent from the head. Clypeus glassy smooth, dorsum of head finely and densely punctate, the punctures superficial and the surface shining. Pilosity of head consisting entirely of fine simple curved hairs which are directed anteriorly except in the vicinity of the ocelli where they are directed approximately towards the mid-dorsal point. Dorsum of head without elongate standing specialized hairs. With the alitrunk in profile the propodeum unarmed, without trace of teeth. Sides of pronotum densely reticulate-punctate, the lateral portions of the mesoscutum, above the pronotum, more finely punctulate. Mesopleuron smooth except for the strip immediately below the wing insertion which is punctate. Metapleuron punctate in the upper half, smooth below. Sides of propodeum densely reticulate-punctate. Mesoscutum with a broad central smooth area but the periphery of the sclerite tending to be punctulate. Scutellum weakly punctulate, the propodeum densely reticulate-punctate. With the pedicel segments in profile spongiform appendages are absent from the petiole and very reduced on the postpetiole where they are represented only by a small lateral and ventral lobe. In dorsal view the petiole node smooth, as long as broad and lacking a transverse lamellar or spongiform strip posteriorly. Postpetiole slightly broader than long, smooth, and having a narrow lamellate strip traversing the posterior margin. First gastral tergite smooth, without trace of basal costulae. Pilosity everywhere on dorsal surfaces of alitrunk, petiole, postpetiole and gaster consisting of quite dense fine simple soft curved hairs which are subdecumbent to decumbent, pointed apically and directed approximately towards the midline on the alitrunk and posteriorly on the pedicel segments and the gaster; without long flagellate or any other specialized hairs. Colour yellow.

Paratype females. TL 2·9–3·1, HL 0·64–0·68, HW 0·46–0·48, CI 71–74, ML 0·20–0·22, MI 30–34, SL 0·50–0·52, SI 108–113, PW 0·46–0·48, AL 0·78–0·85 (7 measured).

As holotype, the petiole node in dorsal view may be fractionally longer than broad.

Holotype female (alate), **Zaire** ('B. Congo' on data label): S. slope of Mt Kahuzi, 1900 m, 5.ix.1957, in nest of *Serrastruma lujae* (Forel) (*E. S. Ross & R. E. Leech*) (CAS).

Paratypes. 7 females with same data as holotype (CAS; MCZ; BMNH).

This series of females, found in a nest of the common *S. lujae*, constitutes the first known socially parasitic dacetine in the Afrotropical region. It is easily distinguished from the female of the host-species, as follows.

inquilina	*lujae*
Scrobes vestigial, upper scrobe margins not sharply defined behind level of anterior margin of eye.	Scrobes present, upper scrobe margin sharply defined to beyond level of posterior margin of eye.
Head without laterally projecting long fine hairs on upper scrobe margins; without specialized standing hairs on cephalic dorsum.	Head with laterally projecting long fine hairs on upper scrobe margins; with specialized standing hairs on cephalic dorsum.
Alitrunk and first gastral tergite with fine soft curved hairs only, without standing hairs.	Alitrunk and first gastral tergite without fine soft curved hairs, with standing hairs.
Pronotal humeri without flagellate hairs.	Pronotal humeri with flagellate hairs.
Propodeum unarmed.	Propodeum bidentate.
Basigastral costulae absent.	Basigastral costulae present.

inquilina – cont.
Petiole node in dorsal view as long as or slightly longer than broad, smooth, lacking a transverse spongiform strip posteriorly.
Scapes long, SI >100

lujae – cont.
Petiole node in dorsal view broader than long, punctate, with a transverse spongiform strip posteriorly.
Scapes short, SI <100.

Serrastruma ludovici (Forel)
(Figs 34, 41)

Strumigenys ludovici Forel, 1904*b*: 369. Syntype workers, MADAGASCAR: 'Madagascar meridional', 1899 (*M. Sikora*) (MHN) [examined].
Strumigenys alluaudi Santschi, 1910*b*: 360. Syntype workers, TANZANIA: Tanga Cave, Kulumuzi, iv.1909 (*Ch. Alluaud*) (NMB) [examined]. **Syn. n.**
Strumigenys (Trichoscapa) alluaudi st. *nigeriensis* Santschi, 1914*b*: 376. Syntype workers, NIGERIA: Olokemeji (*F. Silvestri*) (NMB) [examined]. [Wrongly synonymized with *simoni* by Brown, 1952*a*: 83.] **Syn. n.**
Strumigenys rothkirchi Wasmann, 1918: 142, pl. 2, figs 9, 10. Syntype workers, CAMEROUN: no loc., 1912 (*v. Rothkirch*) (MNHU). [Synonymized with *alluaudi* by Brown, 1952*a*: 75.]
Strumigenys (Cephaloxys) escherichi subsp. *lotti* Weber, 1943: 378, pl. 15, fig. 13. Syntype workers, SUDAN: Equatoria, Lotti Forest, 5.viii.1939, no. 1451 (*N. A. Weber*) (BMNH; MCZ; MRAC) [examined]. **Syn. n.**
Serrastruma alluaudi (Santschi) Brown, 1952*a*: 75.
Serrastruma lotti (Weber) Brown, 1952*a*: 76. [Raised to species.]
Serrastruma ludovici (Forel) Brown, 1952*a*: 85. [Species inquirenda.]

WORKER. TL 1·9–3·0, HL 0·46–0·66, HW 0·36–0·49, CI 71–80, ML 0·17–0·30, MI 35–50, SL 0·32–0·50, SI 86–115, PW 0·26–0·38, AI 0·55–0·80 (85 measured).

Basal 4–8 denticles on mandibular masticatory margin enlarged, usually very conspicuously coarser broader and longer than the preceding denticle row. In a few samples the enlarged denticles not so obvious and sometimes the enlarged series may be better developed on one mandible than on the other. Upper scrobe margins defined by a narrow flange or rim which is broadest just behind the frontal lobes and peters out posteriorly, frequently the rim not even extending to the apex of the scrobe. Upper scrobe margins each with a fine flagellate hair just behind the level of the eye. Clypeus usually finely reticulate to punctate, only rarely the sculpture reduced. Dorsum of head behind clypeus finely and densely reticulate-punctate. Ground-pilosity of cephalic dorsum of short narrow to moderately broad spatulate hairs which are decumbent and directed anteriorly. A row of longer spatulate hairs present on the false margin of the clypeus which project forwards over the bases of the mandibles. Dorsum of head with a single pair of standing stout hairs which are narrowly clavate apically, situated behind the highest point of the vertex. Pronotum narrowly marginate anteriorly, not marginate laterally. Mesonotum in profile sloping posteriorly to the impressed metanotal groove, the propodeal dorsum shallowly convex and sloping posteriorly to the propodeal teeth; these latter variable in size, usually triangular but sometimes reduced to small rounded lobes. Infradental lamella usually narrow and inconspicuous, only rarely moderately broad but sometimes vestigial. Sides of pronotum usually smooth but sometimes with sculpture, especially on the upper portions. Mesopleuron, metapleuron or both punctate, sides of propodeum punctate. Frequently the central area of the mesopleuron with sculpture reduced or absent, more rarely with the central area of the metapleuron smooth. Sculpture of pronotal dorsum very variable, ranging from almost smooth to moderately strongly sculptured. At one end of the range the pronotum is smooth except for a median longitudinal carina, at the other a number of oblique to longitudinal fine striae or costulae are present and the spaces between them may be finely punctulate. All grades between these extremes have been noted, including a few sample where the pronotum is predominantly punctate. Frequently the striate component is reduced leaving weak punctures as the predominant component, but in this case they are by no means as strongly developed nor as conspicuous as the punctures on the mesonotum. Dorsal surface of mesonotum and propodeum reticulate-punctate. Pronotum with humeral flagellate hairs. Mesonotum with a pair of stout curved standing hairs which are clavate apically. Ground-pilosity of dorsal alitrunk of short curved hairs which are sparse and subdecumbent to decumbent. With the pedicel segments in profile the spongiform appendages reduced. Petiole with a narrow ventral strip and small lateral lobe. Postpetiole with a moderately developed ventral lobe which is larger than the lateral spongiform appendage but smaller, and usually obviously smaller, than the exposed area of the postpetiolar disc. In dorsal view the petiole node reticulate to reticulate-punctate, with a narrow posterior spongiform strip. Postpetiole usually

reticulate to reticulate-punctate, rarely the sculpture reduced and superficial, bordered posteriorly by a lamellate spongiform strip which abuts a similar narrow strip on the anterior margin of the first gastral tergite. Basigastral costulae present, usually short. Petiole, postpetiole and gaster dorsally with stout standing hairs which are clavate apically. Colour yellow to mid-brown.

One of the most successful members of the genus and of the Afrotropical dacetines as a whole, *ludovici* ranges very widely over the whole continent and is also established in Madagascar and Mauritius. It is closely related to *simoni* but most *ludovici* samples are instantly distinguishable by the enlarged basal series of mandibular denticles in the latter. In those few samples where the enlargement of the denticles is not marked the differentiating characters tabulated under *simoni* will separate the two.

Apart from the diagnostic enlarged denticle series (Fig. 34) *ludovici* is separated from *dotaja* by the presence in the latter of flagellate mesonotal hairs and simple gastral hairs; from *sulumana* and *maynei* by those species' lack of cephalic flagellate hairs and strongly developed upper scrobe margins. Usually *ludovici* is distinguished from *lujae, serrula* and *concolor* by their blanketing reticulate-punctate pronotal sculpture, which generally is not seen in *ludovici*, but in the few populations of the latter with a predominantly punctate pronotum the enlarged basal mandibular denticles of *ludovici* will separate them. *S. miccata* shares the character of enlarged basal denticles with *ludovici* but this minute species is very easily separated by the characters noted in the discussion of the former.

In his revision of *Serrastruma* Brown (1952*a*) treated *ludovici* under the names *alluaudi* and *lotti*, leaving *ludovici* as a species inquirenda as he had not been able to examine the type-series. However, he speculated that *ludovici* might be the senior synonym of *alluaudi* and that *alluaudi* and *lotti* may grade into one another. A few years ago he informed me that, having examined the types of *ludovici*, he was convinced that the synonymy *ludovici* = *alluaudi* was in order, and further that the characters which he had invoked to separate *lotti* from *alluaudi* (Brown, 1952*a*: 86) were indeed gradient, so that that species should also fall into the synonymy of *ludovici*. The present investigation, utilizing much more material than was available to Brown, has served to confirm all these findings.

Two other changes to the synonymies listed by Brown should be mentioned here. Firstly, the name *alluaudi* st. *nigeriensis* was included by Brown in the synonymy of *simoni*, but a re-examination of the type-series of *nigeriensis* shows them to have the characteristic dentition of *ludovici* and the name is herewith transferred to the synonymy of this species. Secondly, *raymondi* was described from a mixed series of *ludovici* and *simoni* originating in Mauritius, where both are well established. As Brown (1952*a*: 75) pointed out the 'type' (= holotype) designated by Donisthorpe was referable to *simoni*. This is the only specimen in the entire series bearing a type-label and there seems no reason to doubt that this was the specimen chosen as holotype by Donisthorpe; thus *raymondi* is correctly referred to the synonymy of *simoni*, and not to the synonymy of *alluaudi* (= *ludovici*) where it was left by Brown.

Material examined

Guinea-Bissau: Rio Cassine (*L. Fea*). **Ivory Coast**: Sassandra (*I. Löbl*); Man (*I. Löbl*); Man (*V. Mahnert & J.-L. Perret*); Abidjan, Banco Nat. Pk. (*I. Löbl*); Banco Forest (*W. L. Brown*); Issoneu (*V. Mahnert & J.-L. Perret*); Agboville, Yapo Forest (*I. Löbl*); Anguédedou Forest Res. (*W. L. Brown*); Lamto (*W. H. Gotwald & R. Schaefer*); Sangrobo (*W. L. & D. E. Brown*); Divo (*L. Brader*). **Ghana**: Mampong (*D. Leston*); Tafo (*D. Leston*); Tafo (*B. Bolton*); Mt Atewa (*C. A. Collingwood*); Kade (*W. H. Gotwald & R. Schaefer*). **Togo**: Palimé, Klouto Forest (*Vit*). **Nigeria**: Olokemeji (*F. Silvestri*); Gambari (*B. Bolton*). **Cameroun**: Korup (*D. Jackson*); Nkoemvon (*D. Jackson*); nr Yaounde (*G. Terron*). **Gabon**: Makokou (*W. H. Gotwald*); Plateau d'Ipassa (*J. A. Barra*). **Congo**: Nkogo (*L. Fea*). **Zaire**: Irangi (*E. S. Ross & R. E. Leech*); Ruwenzori, Mwenda (*J. C. Bradley*); Ituri Forest, Beni Irumu (*N. A. Weber*); Epulu (*T. Gregg*). **Sudan**: Equatoria, Kagelu (*N. A. Weber*); Lotti Forest (*N. A. Weber*); Imatong Mts (*N. A. Weber*). **Uganda**: Kampala (*N. A. Weber*). **Tanzania**: Amani (*E. S. Ross & R. E. Leech*); Tanga Cave Kulumuzi (*Ch. Alluaud*). **Angola**: Duque de Braganca Falls (*P. Hammond*); Dundo, Carrisso Pk. (*L. de Carvalho*); Saurimo (*L. de Carvalho*). **Mozambique**: Amatongas Forest (*G. Arnold*). **Zimbabwe**: Melsetter (*R. Mussard*); Chirinda Forest (*E. S. Ross & R. E. Leech*). **South Africa**: Natal, Zululand, Eshowe (*R. E. Turner*); Eshowe (*G. Arnold*); Gillitts (*W. L. & D. W. Brown*). **Madagascar**: Perinet (*E. S. Ross*); no loc. (*Sikora*). **Mauritius**: Le Pouce Mt (*R. Mamet*); Le Pouce Mt (*W. L. Brown*); W. of Petria (*W. L. Brown*).

Serrastruma lujae (Forel)

(Fig. 44)

Strumigenys lujae Forel, 1902: 294 (footnote), pl. 1, fig. 1. Syntype workers, MOZAMBIQUE: Zambesi, Morrumballe (*E. Luja*) (MHN) [examined].

Strumigenys reticulata Stitz, 1910: 141. Syntype workers, female, CAMEROUN: Bibundi (*Tessmann*) (MNHU). [Synonymy by Brown, 1952*a*: 78.]

Strumigenys (Cephaloxys) glanduscula Santschi, 1919; 88. Syntype workers, ZAIRE: Yambuya, 25.ii., no. 79 (*Bequaert*) (MRAC; MCZ) [examined]. [Synonymy by Brown, 1952*a*: 78.]

Strumigenys (Xephaloxys) [sic] *bequaerti* Santschi, 1923: 286. Syntype workers, ZAIRE: Ruwenzori, 10.vii.1914 (*Bequaert*) (BMNH; MRAC; MCZ) [examined]. **Syn. n.**

Strumigenys (Cephaloxys) gerardi Santschi, 1923: 287. Syntype workers, ZAIRE: Katanga, R. Kasa, Manyema, 1918 (*Gerard*) (MRAC) [examined]. [Synonymy by Brown, 1952*a*: 78.]

Strumigenys (Cephaloxys) calypso Santschi, 1923: 288, fig. 4a. Holotype worker, TANZANIA: Ouha (*Meyer*) (NMB) [examined]. **Syn. n.**

Strumigenys (Cephaloxys) aequalis Menozzi, 1942: 177. Syntype workers, EQUATORIAL GUINEA: Fernando Po I., Concepcion (*H. Eidmann*) (NMB; MCZ) [examined]. [Synonymy by Brown, 1952*a*: 78.]

Serrastruma lujae (Forel) Brown, 1952*a*: 78.

Serrastruma bequaerti (Santschi) Brown, 1952*a*: 80.

Serrastruma calypso (Santschi) Brown, 1952*a*: 85. [Species inquirenda.]

WORKER. TL 2·2–3·3, HL 0·50–0·80, HW 0·42–0·62, CI 75–86, ML 0·18–0·32, MI 33–42, SL 0·32–0·58, SI 75–100, PW 0·30–0·66, AL 0·58–0·98 (55 measured).

Mandibular denticles regular, without a suddenly enlarged basal series but sometimes the denticular row very evenly and gradually becoming slightly larger towards the base; the basalmost denticle frequently larger than those preceding. Upper scrobe margins with a long simple or weakly flagellate hair projecting laterally just behind the level of the eyes. Dorsum of head reticulate-punctate everywhere, the sculpture fine and even. Ground-pilosity of dorsal head consisting of narrowly spatulate anteriorly curved short hairs which are decumbent or closely applied to the surface. Standing pilosity of head consisting of a posterior transverse row of 4 hairs situated close to the occipital margin and a more anteriorly situated pair just in front of the highest point of the vertex. The standing hairs are usually simple and more or less cylindrical, often pointed apically but sometimes very weakly swollen at their apices. Alitrunk in profile with the promesonotum convex and sloping posteriorly to the impressed metanotal groove. Behind the metanotal groove the propodeum is shallowly convex and sloping to the teeth posteriorly. Propodeal teeth very variable in shape and size, varying from obtuse angles to strong triangular teeth. Infradental lamellae present on the propodeal declivity but often narrow. Sides of alitrunk often reticulate-punctate everywhere but with some variation in intensity. The sides of the pronotum may be only faintly sculptured and, in some cases, the mesopleuron may be partially or entirely smooth. A central smooth patch may also occur on the metapleuron. Dorsal alitrunk reticulate-punctate everywhere, the punctation on the pronotum usually fine and very dense. Sometimes the intensity of the sculpture reduced so that the punctures are less well defined than usual. Pronotum with humeral flagellate hairs present. Mesonotum with a single pair (or exceptionally with 2 pairs) of stout standing hairs situated anteriorly on the sclerite. Ground-pilosity of dorsal alitrunk of scattered finely spatulate hairs which are decumbent to appressed and inconspicuous. With the pedicel segments in profile the spongiform appendages moderately developed. In dorsal view the petiole and postpetiole both bounded posteriorly by a narrow lamellate spongiform strip, both usually punctate or finely reticulate dorsally though on the postpetiole the sculpture may be almost effaced. Base of first gastral tergite with a narrow lamellar strip and with basigastral costulae present. Petiole with one or more pairs of standing stout hairs, the postpetiole with 2 or more pairs; first gastral tergite with numerous similar hairs. Colour yellow to medium brown.

This very successful, common, widely distributed species shows a size range which is notably greater than in any other *Serrastruma*. Brown (1952*a*: 79) has discussed the size variation and concluded that only a single species is represented, and the present survey finds no argument with that conclusion.

The closest relatives of *lujae* are *serrula* and *concolor*, the three together sharing the characters of dense reticulate-punctate sculpture on the pronotal dorsum and lack of an enlarged series of basal denticles on the mandible. Beside these features other easily observed characters useful in separating *lujae* and its immediate allies from the other species of the genus are as follows. In *dotaja* the mesonotum is equipped with a single pair of extremely long flagellate hairs

and the gaster has only a single pair of simple hairs. In *maynei, sulumana* and *geoterra* the upper scrobe margins lack projecting hairs. In *simoni* the spongiform appendages of the pedicel segments are more massively developed (Figs 40, 44). In *ludovici,* beside the enlarged mandibular denticles, the head has only a single pair of standing hairs, situated posteriorly. The minute *miccata* has short mandibles, lacks projecting hairs on the upper scrobe margins and has straight clavate hairs at the pronotal humeri.

S. serrula and *concolor* are both persistently small species, only overlapping the lower end of the size range given for *lujae. S. serrula* is separated from *lujae* by having 3 or 4 pairs of mesonotal standing hairs and elevated ground-pilosity on the head and alitrunk. *S. concolor* has 2 or 4 clavate standing hairs on the head (as opposed to 6 relatively fine hairs in *lujae*), and has only a single pair of hairs on the postpetiole. Beside this most *concolor* specimens show a marked indentation or impression of the upper scrobe margin at the site of origin of the projecting flagellate hair.

The synonymy of *lujae* given by Brown (1952*a*: 78) is extended here to include the names *calypso* and *bequaerti. S. calypso* was included by Brown as a species inquirenda as the holotype of this form was not available for study at the time of his revision. An examination of the *calypso* holotype places it firmly in the synonymy of *lujae. S. bequaerti* was treated as a rather doubtful separate species by Brown (1952*a*: 80) who said 'This form may eventually prove to be a montane subspecies or even a synonym of *lujae*.' He has since informed me that he is now convinced that *bequaerti* and *lujae* grade together without possibility of any meaningful division being made, and I fully concur with this opinion.

S. lujae nests in rotten wood and forages there and in the leaf litter layer. In a letter William L. Brown has informed me that the prey are collembolans. Speaking of his observations in Banco Forest, Ivory Coast, made in 1963, he says 'The *S. lujae* nest was in the split end of a log and consisted of many, perhaps a thousand or more, workers and copious brood. I found the nest by following a single-file trail of workers along the top of the log, spaced out at intervals of 4–10 cm, almost every one of which carried in its jaws a dead (or at least motionless) entomobryid collembolan with furcula extended. The Collembola were about the same size as the ants carrying them, or slightly larger. In the space of about 10 minutes I counted 40 springtails being carried along the log on what appears to have been a trunk foraging trail. No other kinds of insect prey were seen being carried or lying within the dissected nest.'

MATERIAL EXAMINED

Ivory Coast: Banco Forest (*I. Löbl*); Banco Forest (*W. L. Brown*); Man (*I. Löbl*); Man (*V. Mahnert & J.-L. Perret*); Yapo Forest, Agboville (*I. Löbl*); Anguédedou Forest (*W. L. Brown*); Sangrobo (*W. L. & D. E. Brown*). **Ghana**: Tafo (*C. A. Collingwood*); Tafo (*B. Bolton*); Aburi (*D. Leston*); Mamfe Scarp (*D. Leston*); Bolgatanga (*E. S. Ross & K. Lorenzen*). **Nigeria**: Gambari (*B. Bolton*). **Cameroun**: Nkoemvon (*D. Jackson*); nr Yaounde (*G. Terron*); Mt Cameroun (*L. Fea*); Mt Cameroun (*B. Malkin*); Batanga (*G. Schwab*). **Gabon**: Makokou (*W. H. Gotwald*); Plateau d'Ipassa (*J. A. Barra*). **Zaire**: Yambuya (*J. Bequaert*); Ruwenzori (*J. Bequaert*); Ruwenzori (*N. A. Weber*); Burunga (*J. Bequaert*); Katanga, Manyema (*Gerard*); Ituri Forest, Irumu (*N. A. Weber*); Ituri, Mt Hoyo (*E. S. Ross & R. E. Leech*); Albertville (*E. S. Ross & R. E. Leech*); Thysville (*E. A. Ross & R. E. Leech*); Mt Kahuzi (*E. S. Ross & R. E. Leech*); Lwiro R., Bukavu (*E. S. Ross & R. E. Leech*). **Equatorial Guinea**: Fernando Po I., Moka (*L. Fea*); Fernando Po I., Concepcion (*H. Eidmann*). **Säo Tomé I.**: Rib., Palma (*L. Fea*); no loc. (*Bl Malkin*). **Angola**: Gubela (*P. Hammond*); Salazar (*P. Hammond*); Duque de Braganza Falls (*P. Hammond*); Dundo (*A. Machado*); Dundo (*L. de Carvalho*); Tchimana R. (*A. Machado*). **Sudan**: Equatoria, Khor Aba (*N. A. Weber*). **Uganda**: Ruwenzori, Mubuku (*G. O. Evans*); Ft Portal (*N. A. Weber*). **Rwanda**: Rangiro (*P. Werner*). **Burundi**: Bujumbura (*A. Dejean*). **Kenya**: Embu, Irangi Forest Sta. (*V. Mahnert & J.-L. Perret*); Mau Forest (*F. Meneghetti*); Kaimosi Mission (*E. S. Ross & R. E. Leech*); **Tanzania**: Ouha (*Meyer*); Mt Meru (*E. S. Ross & R. E. Leech*); Amani (*E. S. Ross & R. E. Leech*); Uluguru Mts. Bunduki (*E. S. Ross & R. E. Leech*). **Mozambique**: Morrumballe (*E. Luja*). **Zimbabwe**: Umtali, Melsetter (*R. Mussard*); Vumba Mts (*W. L. Brown*). **South Africa**: Cape Prov., Port St John (*R. E. Turner*).

Serrastruma maynei (Forel)

(Fig. 37)

Strumigenys (Trichoscapa) maynei Forel, 1916: 427. Syntype workers, female, male, ZAIRE: Stanleyville (= Kisangani) (*Kohl*) (MHN; MRAC; MCZ) [examined].
Strumigenys (Trichoscapa) maynei var. *latiuscula* Forel, 1916: 428. Syntype workers, ZAIRE: Eala, 20.viii.1912 (*R. Mayné*) (MHN; MRAC; MCZ) [examined]. [Synonymy by Brown, 1952*a*: 77.]
Serrastruma maynei (Forel) Brown, 1952*a*: 77.

WORKER. TL 2·3–3·0, HL 0·52–0·66, HW 0·44–0·54, CI 78–86, ML 0·18–0·24, MI 32–39, SL 0·34–0·42, SI 73–83, PW 0·31–0·41, AL 0·62–0·82 (45 measured).

Mandibular denticles regular, without a suddenly enlarged series of 4–8 denticles basally but often with the basalmost denticle larger than those preceding. Upper scrobe margins strongly developed into broad projecting flanges which run the length of the scrobe and do not peter out posteriorly, the margins without flagellate hairs present. Clypeus sculptured, finely punctulate to granular, with short but broad spatulate ground-pilosity and a row of longer spatulate hairs projecting forwards over the bases of the mandibles from the false anterior clypeal margin. Dorsum of head strongly reticulate-punctate, with conspicuous short but broad spatulate ground-pilosity. In profile the cephalic dorsum behind the highest point of the vertex with 4–6 stout standing hairs which are narrowly to moderately clavate apically, the variation in number occurring in single nest-series. Usually 4 such hairs are present, situated in a row in front of the occipital margin; rarely a pair is present anterior to this row. Alitrunk in profile with promesonotum shallowly convex and sloping more steeply posteriorly to the impressed metanotal groove. Propodeum convex dorsally, on a lower level than the promesonotum and terminating posteriorly in a pair of triangular teeth which are subtended by conspicuous spongiform infradental lamellae. Sides of pronotum longitudinally costulate, usually distinctly so but sometimes the costulae effaced in places or becoming weaker lower down the sides; the spaces between the costulae smooth. Pleurae and sides of propodeum densely reticulate-punctate. Pronotal dorsum longitudinally to obliquely strongly costulate, the spaces between the costulae smooth; this sculpture usually weaker in small workers than in large. Remainder of dorsal alitrunk strongly reticulate-punctate. Flagellate hairs usually absent from pronotal humeri (present in only a single specimen of those examined). Mesonotum with a single pair of curved standing clavate hairs. Ground-pilosity of dorsal alitrunk dense spatulate and very conspicuous. Spongiform appendages of pedicel segments moderately developed in profile. The petiole with a ventral lamella and small lateral processes, the postpetiole with a well developed ventral lobe and smaller lateral lobe. Petiole in dorsal view reticulate-punctate, sometimes only superficially so, with a narrow transverse spongiform strip posteriorly. Postpetiole dorsally smooth to superficially punctulate, sometimes with a suggestion of minute longitudinal striae; with a narrow posterior spongiform strip which abuts a similar strip on the base of the first gastral tergite. Basigastral costulae short. Dorsal surfaces of petiole, postpetiole and gaster with stout apically clavate hairs. Colour dull brownish yellow to mid-brown.

S. maynei is characterized by its absence of flagellate hairs, generally strong costulate pronotal sculpture, broad upper scrobe margins and conspicuous ground-pilosity; it is unlikely to be confused with any other species. In distribution it appears to be restricted to the forest zones of West and central Africa, and Uganda. Georges Terron's collection has yielded a couple of small workers from Cameroun in which the pronotal sculpture is very reduced indeed. These may represent a separate sibling species but I suspect that they are more likely to be members of the first brood of a new colony.

The closest relative of *maynei* is *geoterra*, a species which shares the characters of broad upper scrobe margins, lack of flagellate hairs and very broad conspicuous ground-pilosity. However, in *geoterra* the entire alitrunk is glassy smooth and without trace of sculpture, the upper scrobe margins are very broad and strikingly convex (compare Figs 36, 37), the cephalic ground-pilosity is even coarser than in *maynei*, there is an obvious impression separating the pronotum and mesonotum, the pronotal dorsal pilosity is strong and elevated, and the petiole node is smooth dorsally.

Although often found nesting in rotten wood in the leaf litter layer *maynei* may also nest in rot holes in trees some distance above the ground. In 1970 at Tafo in Ghana I observed a nest in a cocoa branch about 1·7 m above the ground. One of the workers returning to this nest was carrying a small nematoceran fly.

MATERIAL EXAMINED

Guinea-Bissau: Bolama (*L. Fea*). **Ivory Coast**: Lamto (*W. L. & D. E. Brown*). **Ghana**: Aburi (*D. Leston*); Wiawso (*D. Leston*); Tafo (*C. A. Collingwood*); Tafo (*B. Bolton*). **Nigeria**: Gambari (*B. Bolton*). **Cameroun**: nr Yaounde (*G. Terron*). **Equatorial Guinea**: Annobon I. (Cambridge Univ. Expd.). **Zaire**: Kisangani (*Kohl*); Eala (*R. Mayné*); Ruwenzori (*J. C. Bradley*). **Angola**: Dundo (*A. Machado*). **Uganda**: Maragambo Forest (*E. S. Ross & R. E. Leech*). **Tanzania**: Lk. Manyara (*E. S. Ross & R. E. Leech*).

Serrastruma miccata sp. n.

(Fig. 39)

HOLOTYPE WORKER. TL 1·7, HL 0·46, HW 0·32, CI 70, ML 0·12, MI 26, SL 0·37, SI 116, PW 0·24, AL 0·46.

Basal 4–5 denticles on mandibular masticatory margin suddenly and conspicuously enlarged, distinctly much coarser and broader than those preceding. Head narrow, antennal scapes long (CI and SI, above). Upper scrobe margins very feebly developed, merely an edge without a projecting lamina; flagellate hairs absent from upper scrobe margins. Clypeus finely punctulate, with curved narrowly spatulate small hairs and with an anteriorly projecting row of such hairs on the false anterior clypeal margin. Ground-pilosity of cephalic dorsum of minute anteriorly curved inconspicuous hairs which are narrowly spatulate and subdecumbent, those situated posteriorly tending to be splayed or forked at the apex. Dorsum of head without specialized standing longer hairs which are differentiated from the ground-pilosity. Dorsum of head densely reticulate-punctate everywhere. Pronotum narrowly marginate anteriorly, not marginate laterally. In dorsal view the pronotum and mesonotum separated by a shallow faint impression, the mesonotum and propodeum separated by a narrow fine transverse line. In profile the mesonotum weakly raised above the level of the pronotum and sloping shallowly downwards posteriorly. Metanotal groove a narrowly incised line, not impressed. Propodeum continuing the slope of the mesonotum posteriorly and ending in a minute triangular tooth (left tooth broken). Infradental lamellae absent. Pleurae mostly smooth, with some peripheral punctulae. Sides of pronotum with very feeble vestiges of sculpture. Pronotal dorsum with vestigial superficial reticulation, the mesonotum and propodeum finely punctulate. Flagellate hairs absent from alitrunk, the pronotal humeri with a pair of short straight hairs which are quite stout and clavate apically. Dorsal surfaces of pronotum and mesonotum with dense short ground-pilosity consisting of anteriorly or medially curved elevated hairs, those on the mesonotum appearing clavate in profile. Spongiform appendages of pedicel segments in profile very reduced, the ventral petiolar appendage represented only by a minute crest. Ventral lobe of postpetiole very small and lateral process reduced to a thin strip. Petiole node in dorsal view slightly longer than broad, superficially punctulate and with a minute transverse crest on the posterior border which represents the last vestige of the spongiform strip. Postpetiole in dorsal view marginally longer than broad and with its posterior margin sharply indented medially. Spongiform material absent laterally but posteriorly with a narrow lamelliform strip which abuts a similar narrow strip on the base of the first gastral tergite. Postpetiole punctulate-granular and the first gastral tergite with extremely fine short basal costulae. Dorsal surfaces of petiole, postpetiole and gaster with numerous short apically clavate hairs. Colour yellow.

Holotype worker, **Ghana**: Mampong, 26.i.1970 (*P. M. Room*) (BMNH).

Although sharing with *ludovici* the character of an enlarged basal series of mandibular denticles, I suspect that *miccata* has acquired it independently as otherwise the two share very few diagnostic characters. In fact *miccata* is remote from all the known species of *Serrastruma* on a number of counts. Most obvious of these is the differently shaped alitrunk (compare Figs 39–44). Whereas in all other species the posterior portion of the mesonotum slopes to an impressed metanotal groove and the promesonotum forms a surface on a higher level than the propodeum, in *miccata* the mesonotum and propodeum form a more or less uniform slope, the metanotal groove is not impressed and the promesonotum is not at a higher level than the propodeum. In *miccata* the petiole and postpetiole in dorsal view are fractionally longer than broad, whereas in all other species they are broader, in the case of the postpetiole much broader, than long. The mandibles of *miccata* are short but the scapes are long, a combination not found elsewhere in *Serrastruma*, and the lack of elongate specialized hairs on the head and dorsal alitrunk in *miccata* is not repeated elsewhere in the genus, where at least a single cephalic and a single mesonotal pair occur. These characters, along with the unique development of straight clavate hairs at the pronotal humeri in *miccata* in place of the more usual flagellate hairs, and the small size of the species, render it immediately recognizable.

Serrastruma serrula (Santschi)

(Fig. 42)

Strumigenys lujae var. *serrula* Santschi, 1910*a*: 390. Holotype worker, CONGO: Brazzaville (*A. Weiss*) (NMB) [examined].
Strumigenys serrula Santschi; Santschi, 1910*b*: 361. [Raised to species.]
Strumigenys (Cephaloxys) uelensis Santschi, 1923: 289, fig. 4b. Syntype workers, ZAIRE: Haut Uelé, Watsa, xi.1919 (*L. Burgeon*) (MRAC) [examined]. [Synonymy by Brown, 1952*a*: 81.]
Serrastruma serrula (Santschi) Brown, 1952*a*: 81.

WORKER. TL 1·9–2·3, HL 0·44–0·54, HW 0·34–0·44, CI 75–88, ML 0·15–0·18, MI 32–37, SL 0·26–0·33, SI 65–82, PW 0·24–0·30, AL 0·48–0·56 (50 measured).

Mandibular denticles evenly sized to the base or minutely and very gradually increasing in size basally, the basalmost denticle usually enlarged but never with a series of 4–8 obviously enlarged basal denticles. Upper scrobe margins regular or with a shallow impression at the site of the flagellate hair. Ground-pilosity of head narrowly spatulate, quite dense and very conspicuous, curved anteriorly and elevated, not closely applied to the surface. Dorsum of head with an occipital transverse row of 4 standing longer hairs which are usually cylindrical and tapered apically, only very rarely with their apices slightly swollen. Commonly a more anteriorly situated pair of similar hairs is present, just in front of the highest point of the vertex. All of these standing hairs are only slightly longer and stouter than the curved hairs of the ground-pilosity. Entire dorsum of head sharply and strongly reticulate-punctate. Dorsal alitrunk with the convex promesonotum sloping posteriorly to the impressed metanotal groove. Propodeal dorsum convex and sloping down to the teeth, the latter usually acutely triangular but variable in size; infradental lamellae present down the sides of the propodeal declivity. Sides of pronotum and the pleurae punctate, the punctures on the mesopleuron often more superficial and more widely spaced than elsewhere; infrequently the punctures superficial everywhere on the sides. Dorsal alitrunk strongly reticulate-punctate everywhere, the punctures sharply defined and the pronotum often with feeble longitudinal rugulae or striae which when present are very obviously secondary to the punctate component. Pronotum with elongate flagellate hairs at the humeri. Mesonotum with 3 (rarely 4) pairs of standing hairs; these are relatively slender, at most only feebly expanded apically. The posteriormost of these hairs is situated at or very close to the metanotal groove and is very variable in size. In some samples it is almost as long as the preceding mesonotal hairs but frequently is only as long as the ground-pilosity; whatever its length it is always directed posteriorly. Ground-pilosity on promesonotum quite long and conspicuous, dense and elevated, not closely applied to the surface. In profile the spongiform appendages of the pedicel segments moderately developed, the ventral appendage of the petiole may be reduced to a narrow ridge but is usually spongiform. Lateral and ventral spongiform lobes of postpetiole present. In dorsal view the surfaces of both the petiole and postpetiole reticulate to reticulate-punctate, sometimes the sculpture superficial and faint. Posterior spongiform strips of both segments narrow as is the basal strip on the first gastral tergite. Basigastral costulae present but frequently short and widely spaced, the gaster otherwise unsculptured. Petiole and postpetiole always with more than one pair of standing hairs, the gaster with numerous hairs. These vary from almost cylindrical to very weakly expanded apically, not strongly clavate. Colour dull yellow to yellowish brown.

This widespread persistently small species is related to *concolor* and *lujae*. Together the three are characterized by their lack of an enlarged basal series of mandibular denticles, presence of cephalic flagellate hairs and dense reticulate-punctate pronotal sculpture. The differences separating *serrula* and *concolor* are tabulated under the latter name.

S. serrula is separated from *lujae* by its size and pilosity. The largest specimens of *serrula* only overlap the very smallest individuals of *lujae* (*serrula* HW 0·34–0·44, SL 0·26–0·33; *lujae* HW 0·42–0·62, SL 0·32–0·58). Ground-pilosity everywhere on the head and promesonotum is relatively short, inconspicuous and closely applied to the surface in *lujae*. This gives the ant a rather smooth appearance and emphasises the long specialized hairs which stand out very conspicuously. In *serrula* the ground-pilosity is quite long and very distinctive, being markedly elevated from the surface so that the long specialized hairs which project from the ground-pilosity are by no means as distinctive in appearance. On the mesonotum long hairs are restricted to a single anteriorly placed pair in *lujae* (or very exceptionally a second pair may be present, sited very close to the first) whereas in *serrula* three pairs are generally present distributed along the length of the mesonotum and with the posteriormost pair at or very close to the metanotal groove. Finally the reticulate-punctate pronotal sculpture is usually more strongly

developed and more sharply defined in *serrula* than in *lujae* and *serrula* frequently has superimposed fine longitudinal striae or rugulae on the punctate surface.

S. serrula nests in pieces of rotting wood embedded in the leaf litter and topsoil layers, and preys on the isotomid collembolan *Folsomia candida* Willem. Its predatory behaviour has been investigated in some detail by Dejean (1980*a*; 1980*b*).

MATERIAL EXAMINED

Ivory Coast: Tai Forest (*V. Mahnert & J. -L. Perret*); Bingerville (*V. Mahnert & J.-L. Perret*); Lamto (*J. Levieux*); Anguédedou (*W. L. Brown*); Banco Forest (*W. L. Brown*); Divo (*L. Brader*). **Ghana**: Mampong (*P. Room*); Tafo (*B. Bolton*). **Cameroun**: Nkoemvon (*D. Jackson*); nr Yaounde (*G. Terron*). **Gabon**: Makokou (*I. Lieberburg*); Makokou (*W. H. Gotwald*). **Chad**: Haut Mbomu (*N. A. Weber*). **São Tomé I.**: Rib. Palma (*L. Fea*); Vista Algere (*L. Fea*); no loc. (*J. Derron*). **Congo**: Brazzaville (*A. Weiss*). **Zaire**: Ituri Forest, Irumi (*N. A. Weber*); Niangara (*N. A. Weber*); Hout Uelé, Watsa (*L. Burgeon*); Tchikapa (*A. Machado*). **Angola**: Salazar (*P. Hammond*); Duque de Braganca Falls (*P. Hammond*); Gubela (*P. Hammond*); Dundo (*L. de Carvalho*); Camissombo (*A. Machado*). **Sudan**: Equatoria, Kagelu (*N. A. Weber*). **Burundi**: Bujumbura (*A. Dejean*); Imbo Plain (*A. Dejean*); Bugarama (*A. dejean*).

Serrastruma simoni (Emery)

(Fig. 40)

Strumigenys simoni Emery, 1895*a*: 42, pl. 2, fig. 21. Holotype worker, SOUTH AFRICA: Transvaal, Makapan, 1893 (*E. Simon*) (MCSN) [examined].

Strumigenys escherichi Forel, 1910: 261. Syntype workers, ETHIOPIA: Eritrea, Ghinda (*K. Escherich*) (MHN) [examined]. [Synonymy by Brown, 1952*a*: 82.]

Strumigenys cognata Santschi, 1910*b*: 362. Syntype workers, female, ANGOLA: Benguela, Cucala, 1910 (*J. Cruchet*) (NMB; MRAC) [examined]. [Synonymy by Brown, 1952*a*: 82.]

Strumigenys biconvexa Santschi, 1913*a*: 258. Syntype workers, KENYA: Cheteni, xi.1911, st. 4 (*Alluaud & Jeannel*) (NMB) [examined]. [Synonymy by Brown, 1952*a*: 83.]

Strumigenys cognata st. *boerorum* Santschi, 1913*a*: 259. Syntype workers, SOUTH AFRICA: Zululand, Dukuduku (*I. Trägårdh*) (NMB) [examined]. [Synonymy by Brown, 1952*a*: 83.]

Strumigenys escherichi race *limbata* Forel, 1913*c*: 222. Syntype workers, ZIMBABWE: Bulawayo (*G. Arnold*) (MHN) [examined]. [Synonymy by Brown, 1952*a*: 83.]

Strumigenys escherichi var. *cliens* Forel, 1913*d*: 317. Syntype workers, ZAIRE: Katanga, Elizabethville, 1912 (*Bequaert*) (MHN; MRAC; MCZ) [examined]. [Synonymy by Brown, 1952*a*: 83.]

Strumigenys (Trichoscapa) escherichi st. *cognata* var. *obscuriventris* Santschi, 1914*b*: 376. Syntype workers, NIGERIA: Olokemeji (*F. Silvestri*) (NMB) [examined]. [Unavailable name.]

Strumigenys (Trichoscapa) escherichi st. *cognata* var. *fusciventris* Santschi, 1915: 261. [Unnecessary replacement name for *obscuriventris* Santschi.] [Unavailable name.]

Strumigenys (Cephaloxys) raymondi Donisthorpe, 1945: 779. Holotype worker, MAURITIUS: Corps de Garde Mt, 17.i.1944, no. 20 (*R. Mamet*) (BMNH) [examined]. [Wrongly synonymized with *alluaudi* by Brown, 1952*a*: 75. *S. raymondi* series is a mixture of *ludovici* (= *alluaudi*) and *simoni*, but holotype of *raymondi* belongs to the latter species.] **Syn. n.**

Serrastruma simoni (Emery) Brown, 1952*a*: 82.

WORKER. TL 2·4–3·0, HL 0·54–0·64, HW 0·44–0·52, CI 74–85, ML 0·20–0·22. MI 33–39, SL 0·34–0·41, SI 76–86, PW 0·28–0·36, AL 0·64–0·75 (60 measured).

Mandibular denticles small even and very regular, without an enlarged basal series but often with the basalmost denticle somewhat enlarged. Upper scrobe margins conspicuous, forming a punctulate or granular flange which extends back to the apex of the scrobe before petering out, the margins each with a single long flagellate hair arising just behind the level of the eye and projecting laterally. Clypeus sculptured on the disc, finely punctulate or granular, or sometimes feebly striate, with sparse spatulate appressed hairs. False anterior clypeal margin with a row of spatulate hairs which project forwards over the mandibular bases. Ground-pilosity of head of scattered but distinctive anteriorly directed spatulate hairs which are decumbent to appressed. Dorsum of head behind highest point of vertex with two pairs of stout standing hairs which are anteriorly curved and apically clavate. Dorsum of head densely reticulate-punctate. Pronotum not marginate laterally, the pronotum and anterior portion of mesonotum convex and on a higher level than the propodeum, the posterior portion of the mesonotum sloping steeply down to the metanotal groove which is broadly and shallowly impressed. Propodeal dorsum shallowly convex, the teeth usually broad and strongly developed, with a conspicuous infradental lamella. Alitrunk pleurae smooth,

devoid of sculpture or at most with punctulate vestiges peripherally. Sides of pronotum usually smooth but sometimes with one or two striae which extend onto the sides from the dorsum. Sculpture of pronotal dorsum variable, ranging from almost smooth with only vestiges of sculpture to quite strongly sculptured. Commonly the sculpture consists of few to several longitudinal to oblique fine costulae or striae on an almost or quite smooth surface. Variation away from this occurs either by reduction in number and intensity of the costulae or striae until the dorsum is almost unsculptured, or by intensification of the costulae or striae, or by the appearance of fine punctulation between them. However, in samples where punctulate sculpture occurs it is always very obviously secondary to the costulate or striate component, and in samples where the pronotum is smooth a median fine longitudinal carinula usually remains. Dorsal surfaces of mesonotum and propodeum finely and densely reticulate-punctate, as is the upper portion of the propodeal declivity between the teeth. Pronotum equipped at the humeri with a pair of long fine flagellate hairs, the mesonotum with a pair of stout curved hairs which which are clavate apically. Ground-pilosity of promesonotum consisting of a few scattered narrowly spatulate hairs which are appressed or nearly so. Spongiform appendages of pedicel segments well developed in profile, the subpetiolar appendage running the length of the segment; the ventral and lateral spongiform lobes of the postpetiole large, the former usually somewhat larger than the latter. Petiole node in dorsal view finely reticulate-punctate, the sculpture sometimes faint, broader than long and with a conspicuous posterior collar of spongiform material. Postpetiole smooth dorsally, with spongiform material posterolaterally and with a broad posterior strip. Base of first gastral tergite bordered with a lamellate strip upon which the basigastral costulae arise and run posteriorly for a short distance on the tergite proper. Petiole and postpetiole each with a single pair of stout hairs which are clavate apically, the first gastral tergite with 1–8 pairs of such hairs. Colour ranging from yellowish brown to blackish brown.

A very successful and widely distributed species, *simoni* ranges throughout eastern and southern Africa. It has also been found in Nigeria but otherwise there are no records of its presence in West or central Africa, so this sample may represent an introduction or a mislabelled series. It is also known from Mauritius where it was most probably introduced by man.

S. simoni is separated from *dotaja* by the characters tabulated under the latter name. It is quickly distinguished from *lujae* and the related *concolor* and *serrula* by the presence in these three of dense blanketing reticulate-punctate sculpture on the promesonotum, and it is separated from *maynei, geoterra* and *sulumana* by those species' lack of cephalic flagellate hairs, which are very conspicuous in *simoni*. The minute *miccata* is readily separated, not only by its enlarged basal series of mandibular denticles and small size, but also by its possession of short clavate hairs at the pronotal humeri and lack of a metanotal impression. In *simoni* the long humeral flagellate hairs are obvious and the metanotal impression broad. Most samples of *ludovici* are easily distinguished from *simoni* by the presence in the former of a series of 4–8 enlarged denticles basally on the mandibular masticatory margin. However, in some *ludovici* series the denticles are not nearly so sharply defined as is usual, and these may be more difficult to tell apart. The following contrasting characters serve to separate the two, the first character noted is usually sufficient alone.

simoni	*ludovici*
Mandibular denticles small fine and regular to base, the basalmost may be enlarged.	Mandibular denticles with basal 4–8 enlarged.
Dorsum of head behind highest point of vertex with two pairs of standing curved clavate hairs.	Dorsum of head behind highest point of vertex with a single pair of standing curved clavate hairs.
Upper scrobe margins in full-face view forming a conspicuous flange which runs to the apex of the scrobe.	Upper scrobe margins in full-face view forming a narrow weak rim which rapidly peters out posteriorly.
Mesopleuron and metapleuron smooth except for peripheral weak sculpture.	Metapleuron and usually also mesopleuron with reticular or punctate sculpture.
With postpetiole in profile the area of the ventral spongiform lobe exceeding that of the exposed area of the postpetiolar disc (Fig. 40).	With postpetiole in profile the area of the ventral spongiform lobe usually much less than that of the exposed area of the postpetiolar disc; only rarely the two subequal (Fig. 41).

simoni – cont.
Infradental lamellae on propodeum broad and conspicuous.
Ranges of indices. SI 76–86, CI 74–85, MI 33–39 (ML = 0·42–0·48×HW).

ludovici – cont.
Infradental lamellae on propodeum usually narrow or vestigial.
Range of indices, SI 86–115, CI 71–80, MI 35–50 (ML = 0·45–0·68×HW).

The extensive synonymy of *simoni* is basically as Brown (1952*a*: 82–83) left it except for a couple of minor modifications. The name *alluaudi* st. *nigeriensis*, formerly included in the synonymy of *simoni*, has been transferred to *ludovici* as its type-series shows the characteristic dentition of that species. *S. raymondi* has been brought into the synonymy of *simoni* from that of *ludovici*. The original series of *raymondi* consisted of a mixture of both species but the holotype is a very oridinary specimen of *simoni*.

Material examined

Nigeria: Olokemeji (*F. Silvestri*). **Ethiopia**: Eritrea, Ghinda (*K. Escherich*). **Kenya**: Cheteni (*Alluaud & Jeannel*). **Burundi**: Imbo Plain (*A. Dejean*). **Uganda**: Entebbe (*G. Arnold*). **Zaire**: Shaba, Lubumbashi (*Bequaert*). **Malawi**: Lk. Nyasa, Urundi (*E. S. Ross & R. E. Leech*); Mzimba (*E. S. Ross & R. E. Leech*). **Zambia**: Kasama (*E. S. Ross & R. E. Leech*). **Mozambique**: Amatongas Forest (*G. Arnold*). **Zimbabwe**: Bulawayo (*G. Arnold*); Sawmills (*G. Arnold*); Victoria Falls (*G. Arnold*); Victoria Falls (*W. L. Brown*). Matopos (*G. Arnold*); Harare, Chishawasha (*A. Watsham*). **Angola**: Dundo (*A. Machado*); Benguela, Cucala (*Cruchet*). **Botswana**: Okavango, Maxwee (*A. Russell-Smith*). **South Africa**: Transvaal, Makapan (*E. Simon*); Acornhoek (*Tucker*); Natal, Dukuduku (*I. Trägårdh*); Dukuduku (*W. L. & D. E. Brown*); Durban (*H. B. Marley*); Hlabisa (*J. C. Faure*); Richards Bay (*J. C. Faure*); Sordwana (*J. C. Faure*). **Mauritius**: Corps de Garde Mt (*R. Mamet*).

Serrastruma sulumana sp. n.

Holotype worker. TL 2·0, HL 0·50, HW 0·33, CI 66, ML 0·22, MI 44, SL 0·40, SI 121, PW 0·23, AL 0·58.

Small narrow-headed species with relatively long mandibles and very long scapes. Mandibles slender, serially finely denticulate, the apical tooth subspiniform and the denticles becoming gradually slightly larger towards the base. Rounded angle separating masticatory and basal margins of mandible surmounted by a thin translucent crest which follows the curve and represents the remains of the basal lamella. Anterior clypeal margin translucent and convex, overhung by the false clypeal margin which is equipped with anteriorly projecting hairs. Antennal scrobes vestigial, the dorsum rounding into the sides except in front of the level of the eye where a feebly angular upper scrobe margin remains. The eyes freely visible in full-face view on the ventrolateral margins of the head because of the disappearance of the upper scrobe margins which partially or wholly obscure them in most other members of the genus. Occipital corners evenly rounded, the occipital margin shallowly concave. Antennal scapes very long and slender, subcylindrical, slightly increasing in thickness from base to apex, the leading edges only with fine curved hairs, without bizarre projecting pilosity. Ground-pilosity of head of inconspicuous curved narrowly spatulate hairs. A transverse row of 4 stouter more erect hairs present paralleling the occipital margin but the head without flagellate hairs. Dorsum of head finely and densely reticulate-punctate. Pronotum not marginate laterally, the humeri broadly rounded and each with a long fine flagellate hair. In profile the posterior half of the mesonotum descending steeply to the broadly impressed metanotal groove. Propodeal dorsum elevated behind the level of the metanotal groove then sloping shallowly backwards. Propodeal teeth elevated, long and narrowly triangular, without an infradental lamella. Sides and dorsum of alitrunk evenly and densely reticulate-punctulate everywhere. Dorsal alitrunk with inconspicuous curved narrowly spatulate pilosity, the mesonotum without standing specialized hairs such as are usually seen in *Serrastruma* species. Petiole and postpetiole reticulate-punctate everywhere, the gaster smooth and with vestigial basal costulae. Spongiform appendages of pedicel segments very reduced. In profile the subpetiolar appendage reduced to a narrow translucent strip and the subpostpetiolar lobe represented only by a thin laminar fringe around the curve of the sternite. In dorsal view the petiole and postpetiole each with minute vestiges of their respective transverse posterior spongiform strips, the best developed section being at the posterolateral angles of the postpetiole. Petiole, postpetiole and gaster dorsally with a number of erect to suberect quite stout hairs which are thickened apically. Colour pale yellow.

Paratype worker. TL not measurable as pedicel segments and gaster missing, HL 0·56, HW 0·36, CI 64, ML 0·25, MI 45, SL 0·46, SI 127, PW 0·24, AL 0·62. As holotype.

Holotype worker, **Cameroun**: nr Yaounde, sample SK (*G. Terron*) (ENSA).
Paratype. 1 worker with same data as holotype (BMNH).

A very distinctive small species of *Serrastruma* immediately separated from all its congeners by its combination of narrow head with relatively long mandibles and extremely long scapes, reduced upper scrobe margins which lack flagellate hairs, inconspicuous cephalic ground-pilosity, presence of humeral flagellate hairs but lack of specialized large hairs on the mesonotum, and vestigial spongiform tissue on the pedicel segments.

CLADAROGENYS Brown

(Fig. 45)

Cladarogenys Brown, 1976: 33. Type-species: *Cladarogenys lasia* Brown, 1976: 34, figs. 1–5, A–D, by original designation.

DIAGNOSIS OF WORKER. Afrotropical dacetine ants. Mandibles elongate and narrow (MI 46), produced into long narrow projecting blades which taper apically, lacking an apical fork of spiniform teeth. Instead the mandible is equipped apically with a crowded series of small denticles and the distal two-thirds of the blade has irregularly spaced minute denticles. Proximal one-third of mandible edentate and lacking a differentiated basal lamella. Antennae with 6 segments, the scapes cylindrical. Orbicular hairs absent.

The single species included in this genus, *C. lasia*, is certainly a direct derivative of *Serrastruma*, separated only by its more specialized mandibles which, whilst appearing longer in *Cladarogenys*, are in fact within the known range of mandible relative length of *Serrastruma* (MI 26–50), and only seem longer because they are narrower. Basically the mandibles are the same as in *Serrastruma*, with a rounded angle separating the basal and masticatory margins and lacking a differentiated basal lamella, but, whereas the continuous rows of denticles on the masticatory margins are opposable in *Serrastruma* throughout the length of the blade, in *Cladarogenys* the narrowing of the blades has meant that the mandibles are only properly opposable at the extreme apex and for most of their length are separated by a gap. This has lead to, or has been accompanied by, a reduction in the denticle row down the length of the blades which probably indicates that these areas are no longer used in prey seizure, this function having devolved upon the apical clump of denticles alone.

The remainder of the head and the form of the body in general agree so closely with *Serrastruma* that I doubt whether a separate genus is really necessary for *C. lasia*, and I strongly suspect that a revision of the short-mandibulate dacetine genera on a world wide basis will see the synonymy of *Cladarogenys* under *Serrastruma*. Known only from the holotype collected in Gabon, *C. lasia* has been well described and profusely illustrated by Brown (1976). The following notes (and Fig. 45) are abstracted from that original description.

Cladarogenys lasia Brown

(Fig. 45)

Cladarogenys lasia Brown, 1976: 34, figs 1–5, A–D. Holotype worker, GABON: nr Makokou, Laboratoire de Primatologie et d'Ecologie Equatoriale, ix.–xii.1972, berlesate of rain forest litter and humus (*I. Lieberburg*) (MCZ).

WORKER. TL 3·2, HL 0·70, HW 0·52, CI 74, ML 0·32, MI 46, SL 0·55, SI 106, AL 0·84.

Mandibles as noted under the generic diagnosis and Fig. 45. Anterior clypeal margin prominent medially but not overlapping the bases of the mandibles. Posterodorsal margins of head forming a raised rim which extends to the posterolateral margin, expanded into a small flat truncated tubercle on each side and with a similar but smaller tubercle in front of this, just dorsal to the eye on each side. Dorsum of head densely clothed with simple fine hairs and with a long flagellate hair arising from the tubercle above the eye on each side. Dorsum of head irregularly rugulose, the spaces between the rugulae reticulate-punctate; clypeal dorsum reticulate-punctate. Posterodorsal corners of vertex with a sulcus which parallels the rim and is composed of 3–4 partially confluent foveae with concave shining bottoms. Pronotal humeri bluntly tuberculate and equipped with a pair of long flagellate hairs. Metanotal groove impressed. Pronotal dorsum shining, with quite dense shallow foveolae, the remainder of the dorsal alitrunk reticulate-punctate with superimposed rugulae, some of them enclosing irregular pits. Sides of pronotum finely punctate, mesopleuron finely punctulate and remainder of pleuron smooth; sides of propodeum reticulate-punctate. Petiole and postpetiole punctulate-rugulose. Gaster smooth with conspicuous basal costulae. Entire

dorsum of body densely clothed with fine simple pilosity, and with paired long flagellate hairs on mesonotum and petiole. Postpetiole with several and gaster with more than 30 flagellate hairs.

EPITRITUS Emery
(Figs 46–48)

Epitritus Emery, 1869*a*: 136. Type-species: *Epitritus argiolus* Emery, 1869*a*: 136, fig. 1, by monotypy.

Diagnosis of worker. Afrotropical dacetine ants. Mandibles elongate and linear (MI 31–48), produced into long narrow projecting blades but lacking an apical fork of spiniform teeth. Instead the mandibular apex is equipped with either a more or less vertical array of denticles or with a single apicodorsal spiniform tooth subtended by a row of denticles. Preapical teeth or denticles present or absent. Antennae 4 or 6 segmented. In all Afrotropical species the scape is strongly bent backwards and has a large anteriorly projecting subbasal lobe at the bend. Orbicular hairs present on the head. Labral lobes elongate-conical and visible in full-face view in the space enclosed by the mandibular blades.

In its modern restricted sense *Epitritus*, as redefined by Brown (1949*b*), contains only seven species restricted to the Old World. Bolton (1972) presented a key dealing with all the species known to that date. Prior to Brown's redefinition a number of unrelated species were associated under *Epitritus* but these were dispersed to various other genera by Brown (1948; 1949*b*), who also showed (Brown, 1958) that the antennae in this genus may have 4 or 6 segments (until then the known species had 4-merous antennae). Two Afrotropical species originally described in *Epitritus, marginatus* and *mandibularis*, which were retained there by Arnold (1917) and Wheeler (1922), were placed in a separate genus, *Miccostruma*, by Brown (1948), a generic name now synonymized under *Smithistruma*.

Apart from the four West African species dealt with here the remaining three show a wide distribution, with *argiolus* Emery from a number of Mediterranean lands, *hexamerus* Brown from Japan, and *murphyi* Taylor from West Malaysia and Sarawak. An undescribed species from Nepal is also known.

The origins of *Epitritus* appear to lie among the short-mandibulate dacetines related to *Smithistruma* rather than with the long-mandibulate allies of *Strumigenys*. Brown (1958) first postulated that *Epitritus* was a long-mandibulate genus independently derived from an ancestral short-mandibulate *Smithistruma*-like stock, and the later description of *Dysedrognathus* by Taylor (1968*b*) produced a plausible intermediate stage which strengthened the hypothesis.

List of Afrotropical *Epitritus*

laticeps Brown
minimus Bolton
roomi Bolton
tiglath **sp. n.**

Key to species (workers)

1 Antennae with 4 segments. Postpetiole in profile with a large spongiform ventral lobe which is as deep as the height of the postpetiolar node. Minute species, HW 0·29–0·31 (Fig. 46). (Ghana, Cameroun) .... ***minimus*** (p. 355)

– Antennae with 6 segments. Postpetiole in profile without or with a vestigial ventral lobe. Larger species, HW >0·35 2

2 Tooth at dorsal apex of mandible long and spiniform, strongly crossing over the tooth from the opposite mandible when the blades are closed; MI 35–38, HW >0·50. Area of head immediately behind the posterior clypeal margin without orbicular hairs (Fig. 47). (Ghana, Ivory Coast, Cameroun) .... ***roomi*** (p. 356)

– Tooth at dorsal apex of mandible short, not spiniform, not crossing over the tooth from the opposite mandible when the blades are closed; MI 35–48 but if MI <40 then HW only about 0·39. Orbicular hairs on head present immediately behind the posterior clypeal margin 3

3 Dorsal surface of each mandibular blade with two large flattened hairs arising on the distal half. Posterior half of mesonotum not humped in profile. Minute species with shorter mandibles, HW 0·39, MI 35. (Ivory Coast) .... ***tiglath*** (p. 357)

– Dorsal surface of each mandibular blade without flattened hairs arising from them. Posterior half of mesonotum distinctly humped in profile. Larger species with longer mandibles, HW >0·45, MI 42–48. (Ivory Coast, Nigeria, Cameroun) .... ***laticeps*** (p. 355)

Epitritus laticeps Brown
(Fig. 48)

Epitritus laticeps Brown, 1962*a*: 77, figs 1–4. Holotype and paratype workers, NIGERIA: nr Zungeru on the Kaduna road, 19.xii.1956, base of dead tree, S780 (*W. A. Sands*) (BMNH; MCZ; USNM) [examined].

WORKER. TL 1·7–2·2, HL 0·40–0·48, HW 0·46–0·59, CI 115–125, ML 0·18–0·22, MI 42–48, SL 0·22–0·29, SI 47–50, PW 0·26–0·32, AL 0·41–0·50 (12 measured).

Mandibular blades with a single preapical denticle, situated close to the apex. Apical armament of mandible consisting of a series of 7–8 denticles, without a conspicuously elongate spiniform tooth at the dorsal end of the series. Dorsal surfaces of mandibular blades naked, without large flattened hairs arising from them. Anterior clypeal margin with 4 long strap-like spatulate hairs which project forwards, the outer pair longer than the inner; and also with a short spatulate hair close to the inner base of each mandibular blade. Clypeus shining, with numerous very small appressed spatulate hairs. Remainder of head finely densely reticulate-punctate and equipped with orbicular hairs which occur from the posterior clypeal margin to the occiput; without a large space behind the clypeus which is free of orbicular hairs. Antennae 6-segmented, the scapes strongly back-curved and with a large anteriorly directed subbasal lobe at the bend, the leading edge with a row of projecting large flattened to spoon-shaped hairs. Alitrunk in profile with the mesonotum strongly humped posteriorly, the highest point of the outline being at or just behind the mesonotal midlength. Anteriorly the mesonotum slopes down to its junction with the pronotum and posteriorly it joins the still more steeply sloped propodeal dorsum. Propodeal declivity bordered by a broad lamella, usually without teeth but rarely an angular tooth is developed, projecting posteriorly from the dorsal end of the lamella. Sides of alitrunk densely reticulate-punctate everywhere. In dorsal view the alitrunk with a very shallow and feeble impression between pronotum and mesonotum and with a distinct transverse line between mesonotum and propodeum, the entire surface densely reticulate-punctate. Alitrunk lacking bizarre pilosity but dorsally with scattered minute simple hairs. Petiole and postpetiole reticulate-punctate. In dorsal view both pedicel segments conspicuously broader than long, the postpetiole with a concave anterior face and a shallow median longitudinal impression. Spongiform appendages vestigial, reduced to a narrow posterior transverse strip on the petiole node, a similar but somewhat broader strip on the postpetiole and with a short strip on the anterior postpetiolar border which traverses the most concave part of the margin. In profile both segments lacking ventral spongiform appendages, the lateral appendage of the postpetiole very reduced and present only at the posterior angle. Dorsal surfaces of pedicel segments with minute hairs as on pronotum, the first gastral tergite with larger long strong hairs which are clavate apically; the surface of the tergite weakly reticulate-shagreened and with short feeble basal costulae. Colour medium brown.

The closest relative of *laticeps* is *tiglath*, which shows most of the characters of *laticeps* including the 6-segmented antennae, lack of a spiniform tooth dorsally in the apical armament of the mandible, orbicular hairs which occur immediately behind the clypeus and vestigial spongiform appendages on the petiole and postpetiole. Features separating the two species are as follows.

laticeps	*tiglath*
Larger species with longer mandibles, HW 0·46–0·59, MI 42–48.	Smaller species with shorter mandibles, HW 0·39, MI 35.
Dorsal surfaces of mandibular blades lacking large flattened hairs.	Dorsal surfaces of each mandibular blade with two large flattened hairs.
Subbasal lobe of scape broad and bluntly rounded.	Subbasal lobe of scape narrow and narrowly rounded.
Mesonotum strongly swollen and humped posteriorly.	Mesonotum not swollen, not humped posteriorly.

MATERIAL EXAMINED

Ivory Coast: Abidjan, Banco Forest (*I. Löbl*); Adiopodoume (*V. Mahnert & J.-L. Perret*); Bingerville (*V. Mahnert & J.-L. Perret*). Gregbeu (*V. Mahnert & J.-L. Perret*). **Nigeria**: Ibadan (*B. R. Critchley*); nr Zungeru (*W. A. Sands*). **Cameroun**: nr Yaounde (*G. Terron*).

Epitritus minimus Bolton
(Fig. 46)

Epitritus minimus Bolton, 1972: 205, figs 1, 2. Holotype and paratype workers, GHANA: Eastern Region,

Akwapim Dist., Mampong, litter sample in cocoa farm, 27.vii.1970 (*P. M. Room*) (BMNH; MCZ) [examined].

WORKER. TL 1·2, HL 0·29, HW 0·29–0·31, CI 100–107, ML 0·09, MI 31, SL 0·17, SI 55–59, PW 0·20–0·21, AL 0·32 (2 measured).

Mandibles without preapical teeth and without an elongate spiniform tooth at the dorsal apex. Apical armament of mandible a more or less vertical series of 6 small denticles of which the basalmost is the largest, the prebasal approximately half this length and the upper group of 4 only about a quarter the length of the basal. Dorsal surfaces of each mandibular blade with two large flattened hairs, the distal hair slightly smaller than the proximal. Anterior clypeal margin with 4 large flattened hairs which project anteriorly, and with a pair of smaller hairs. Clypeus with minute scale-like hairs only. Dorsum of head with numerous large orbicular hairs which occur from the posterior clypeal margin to the occiput, the dorsum with a narrow median longitudinal strip which is free from such hairs. Head without any other form of pilosity. Antennae with 4 segments, the scape with a very strongly prominent subbasal lobe and fringed with large flattened to spoon-shaped projecting hairs. Eyes minute, of a single ommatidium. Anteromedian portion of clypeus shining, the remainder of the head finely and very densely punctulate-granular and dull. Promesonotum fused in profile, the point of junction marked by a slight impression. Mesonotum behind the impression shallowly convex and weakly inflated, ending posteriorly on a slightly higher level than the propodeum. Propodeal dorsum convex and sloping downwards posteriorly, without teeth or spines but the declivity margined by a conspicuous lamella on each side. Dorsum of pronotum, and to a lesser extent the mesonotum, with scattered minute stubble-like erect hairs which are shorter than the diameter of the propodeal spiracular orifice. In dorsal view the alitrunk densely and finely punctulate-granular everywhere, the shallow impression separating pronotum and mesonotum feebly visible medially, but the mesonotum and propodeum separated by a distinct transverse line. Petiole and postpetiole both broader than long in dorsal view, the latter much broader than the former; the petiole without spongiform appendages and such appendages restricted on the postpetiole to a posterior transverse strip which is broadly interrupted medially. In profile the petiole peduncle ventrally with a small anteriorly situated lamella, without spongiform material. Postpetiole in profile with moderately developed spongiform appendages posterolaterally and with a conspicuous ventral spongiform lobe. Petiole and postpetiole punctulate-granular, with sparse minute hairs such as are present on the pronotum. Gaster with short weak basal costulae, with short erect weakly clavate straight hairs. Colour dull yellow to yellowish brown.

Known only from two series, *minimus* is easily separated from its Afrotropical congeners by its 4-merous antennae, small size and strongly developed spongiform ventral lobes on the postpetiole.

MATERIAL EXAMINED

Ghana: Mampong (*P. M. Room*). **Cameroun**: nr Yaounde (*G. Terron*).

Epitritus roomi Bolton
(Fig. 47)

Epitritus roomi Bolton, 1972: 206, figs 3, 4. Holotype worker and paratype female, GHANA: Eastern Region, Akwapim Dist., Mampong, litter sample in cocoa farm, 10.iv.1970 (*P. M. Room*) (BMNH) [examined].

WORKER. TL 1·8–2·1, HL 0·42–0·47, HW 0·54–0·58, CI 120–129, ML 0·15–0·17, MI 35–38, SL 0·25–0·28, SI 45–48, PW 0·32–0·35, AL 0·46–0·52 (7 measured).

Mandibles with a single short recurved preapical tooth which is situated very close to the apex. Apical armament of mandibular blades consisting of a dorsally situated elongate spiniform tooth, which crosses the opposite mandible at full closure, subtended by an edentate or microscopically serrate lamina and ending ventrally in a denticle. Dorsal surface of each mandibular blade with two large flattened hairs arising on the distal half, the apicalmost hair the largest, the second narrower and tending to be directed towards the midline between the mandibles. Anterior clypeal margin with 4 anteriorly projecting long spatulate or strap-like hairs, the outer pair the longest. A much smaller pair of spatulate hairs also present, projecting forwards from the clypeus between the larger hairs on each side. Clypeus dully shining, equipped with minute appressed spatulate hairs. Remainder of head densely reticulate-punctate and with conspicuous large orbicular hairs. Space on head behind the clypeus free of orbicular hairs, such hairs not commencing immediately behind the posterior clypeal margin. Antennae with 6 segments, the scape with a prominent anteriorly projecting subbasal lobe and fringed with large flattened to spoon-shaped hairs on the leading edges. Alitrunk in dorsal view with a broad but shallow arched impression between pronotum and

mesonotum. Propodeum separated from mesonotum by a feebly impressed line. In profile the dorsal outline of the alitrunk is impressed at the pro-mesonotal junction and the mesonotum is convex posterior to this. Propodeum shallowly convex and sloping downwards posteriorly to the broad laminae which border the declivity. Alitrunk everywhere finely and densely reticulate-punctate and dull. Specialized hairs absent from alitrunk but the dorsum, especially on the pronotum, with a scattered stubble of minute simple hairs. Petiole and postpetiole in dorsal view both distinctly broader than long, the latter with a conspicuous median impression. Spongiform appendages restricted to a narrow lamellar strip behind the petiole node, another behind the postpetiole and one across the anterior margin of the postpetiole which is short and restricted to the median concave portion of the margin. In profile the petiole with a narrow ventral carina, the postpetiole with a vestigial ventral lobe and a larger posterolateral lobe. Pedicel segments and first gastral tergite reticulate-punctate to granular, the latter with short feeble basal costulae but equipped with a number of erect clavate hairs. Colour medium brown.

A very conspicuous species, easily separated from both its Afrotropical congeners which have 6-merous antennae by the form of the mandibles and distribution of orbicular hairs on the head. In *roomi* the mandibular apex terminates dorsally in an elongate spiniform tooth which strongly crosses over its counterpart on the opposite mandible at full closure, and the orbicular hairs do not commence immediately behind the posterior clypeal margin. In both *laticeps* and *tiglath* the mandibles do not have an enlarged spiniform tooth at the dorsal mandibular apex and the orbicular hairs commence immediately behind the posterior clypeal margin.

MATERIAL EXAMINED

Ghana: Mampong (*P. M. Room*). **Ivory Coast**: Issoneu (*V. Mahnert & J.-L. Perret*). **Cameroun**: nr Yaounde (*G. Terron*).

Epitritus tiglath sp. n.

HOLOTYPE WORKER. TL 1·4, HL 0·34, HW 0·39, CI 115, ML 0·12, MI 35, SL 0·20, SI 51, PW 0·25, AL 0·38.

Mandibles each with a single minute preapical denticle which is situated very close to the apex and may be obscured by the flattened hairs. Apical mandibular armament consisting of a series of denticles arranged in a more or less vertical row, the basalmost of which appears to be the largest. Without an elongate spiniform tooth at the dorsal end of the series. Two large flattened hairs arise from the dorsal margin of each mandibular blade on their distal halves; the hair closest to the apex is slightly smaller than the one sited nearer the mandibular midlength. Anterior clypeal margin with 4 large spatulate to strap-like hairs which project anteriorly, the outer pair, at the anterolateral angles, is the longest. A pair of much smaller spatulate hairs also projects from the anterior clypeal margin above the mandibular bases and between the larger hairs. Clypeus dully shining and with minute appressed spatulate hairs. Remainder of head reticulate-punctate to granular and densely clothed with large orbicular hairs which occur from immediately behind the posterior clypeal margin to the highest point of the vertex. Antennae with 6 segments, the scapes with a large anteriorly projecting subbasal lobe and fringed around the leading edges with large flattened to spoon-shaped hairs. Outline shape of head capsule as shown for *laticeps* (Fig. 48). Alitrunk in profile with the anterior portion of the mesonotum extremely shallowly concave, the posterior portion very weakly convex just in front of the narrowly incised metanotal groove, the mesonotum not strongly swollen or humped posteriorly. Propodeal dorsum sloping downwards posteriorly, without teeth but the declivity margined on each side by a broad finely spongiform lamella. In dorsal view the pronotum and mesonotum separated by a shallow impression, the mesonotum and propodeum separated by the conspicuous finely incised line of the metanotal groove. Entire alitrunk finely and densely reticulate-punctate, without specialized hairs but the dorsum with stubble-like microscopic erect simple hairs. Petiole node in dorsal view broader than long, bordered posteriorly by a narrow lamellate strip. Postpetiole broader than long, the anterior margin concave, the posterior margin convex and with a distinct median longitudinal impression. The posterior margin of the postpetiole with a narrow lamellate strip, the anterior margin with a short lamellate strip traversing the most concave portion of the border. Ventral surface of petiole with a narrow longitudinal ridge, the postpetiole ventrally without lamellate or spongiform lobes but posterolaterally with a small spongiform appendage. Both petiole and postpetiole reticulate-punctate to granular and equipped dorsally with minute stubble-like hairs such as are seen on the alitrunk. First gastral tergite with straight hairs which are clavate apically, the basigastral costulae short and weak; sculpture of fine reticulation or shagreening. Colour light yellowish brown.

Holotype worker, **Ivory Coast**: Tai Forest, no. 45, 12.viii.1975, in sample of *Oligomyrmex* sp. (*T. Diomande*) (BMNH).

This small species, the fourth *Epitritus* to be found in sub-Saharan Africa, is closest related to *laticeps*. Characters separating the two are tabulated under *laticeps*.

STRUMIGENYS F. Smith

(Figs 49–66, 68–77)

Strumigenys F. Smith, 1860: 72. Type-species: *Strumigenys mandibularis* F. Smith, 1860: 72, by monotypy.
Labidogenys Roger, 1862: 249. Type-species: *Labidogenys lyroessa* Roger, 1862: 251, pl. 1, fig. 17, by monotypy. [Synonymy by Brown, 1959*a*: 38.]
Pyramica Roger, 1862: 251. Type-species: *Pyramica gundlachi* Roger, 1862: 253, pl. 1, fig. 18, by monotypy. [Synonymy by Brown, 1959*a*: 37.]
Proscopomyrmex Patrizi, 1946: 294. Type-species: *Proscopomyrmex londianensis* Patrizi, 1946: 295, figs 1, 2, by monotypy. [Synonymy by Brown, 1949*a*: 15.]
Eneria Donisthorpe, 1948: 598. Type-species: *Eneria excisa* Donisthorpe, 1948: 598, fig. 1 (= *Strumigenys loriae* Emery), by original designation. [Synonymy by Brown, 1949*a*: 15.]

Diagnosis of worker. Afrotropical dacetine ants. Mandibles extended into elongate narrow linear blades (MI 26–65) which terminate in an apical fork of two spiniform teeth arranged in a more or less vertical series, the dorsal fork tooth the longest. Intercalary teeth between the fork teeth sometimes present. Each mandibular blade with one to two preapical teeth on the inner margin. Palp formula 1,1. Eyes ventrolateral, below the antennal scrobes. Antennae with 6 segments, sometimes funicular segments 2–3 very reduced. Petiole node not bidentate dorsally. Postpetiole with spongiform appendages present. Specialized body pilosity frequently present.

By far the largest dacetine genus, *Strumigenys* has endemic species in all the zoogeographical regions except the Palaearctic, and in all regions except the Nearctic it has a greater number of species than any other dacetine genus (see table, p. 270).

Modern taxonomic understanding of *Strumigenys* depends almost entirely upon the works of Brown who, beginning in 1948, has sorted the great diversity of forms previously included in the genus and has completed a large number of descriptive, faunistic and revisionary works on *Strumigenys* and its allies, on a world wide basis. Key works in this series include Brown (1948; 1949*a*; 1949*b*; 1953*a*; 1954; 1959*a*; 1959*b*; 1962*c*; 1973*c*; and their included references), as well as those other papers discussed in the introductory section of the present paper.

The first revisionary treatment of Afrotropical *Strumigenys* was that of Brown (1954), who recognised 14 valid species. Prior to this date the only synthesizing studies of the genus in Africa were those of Arnold (1917) on the South African fauna, and the regional catalogue of Wheeler (1922). Each of these author's concept of *Strumigenys* included members of three genera by modern reckoning, *Strumigenys*, *Smithistruma* and *Serrastruma*; the last two of these being grouped together by Wheeler in a subgenus *Cephaloxys*. Brown (1948) realised that *Strumigenys* as thus constituted contained several discrete evolutionary lines and proceeded to split the genus into the groups which we recognize today. Collections made since Brown's (1954) revision have greatly increased the number of African species, which now stands at 41.

As Brown (1954) indicated, it seems that the entire Afrotropical fauna of the genus belongs in a single species-group, the *rogeri*-group, which has undergone an extensive adaptive radiation in sub-Saharan Africa. The core-species of the group are represented by the *faurei*-complex, and what I assume to be the most generalized character states within the complex (and thus within the group as a whole) are shown by *faurei*, *petiolata* and *rufobrunea*, as follows.

Mandibles with two preapical teeth on each blade, the proximal of which is the largest; inner margins of blades without tumuli, lamellae or other excrescences. Apical fork of mandible without intercalary teeth, the upper spiniform tooth of the fork longer than the lower, the lower spiniform fork tooth with an extremely minute denticle or prominent angle ventrobasally which may only be visible when the mandibular apices are viewed from behind.

Preocular notch present, the eye detached anteriorly from the side of the head. A ventral preocular impression present behind and separate from the postbuccal impression, the ventral preocular impression running from the preocular notch towards the ventral midline but not reaching the midline.

Eyes relatively large, generally at least equal to the maximum width of the scape. Antennal scapes linear or slightly expanded at about the middle third, not strongly dorsoventrally flattened nor with the leading

edges strongly convex. Mesonotum depressed posteriorly, with a single pair of standing hairs; alitrunk without dense erect standing pilosity.

Upper scrobe margins bordered by a narrow lamina, sinuate or curved in full-face view.

Ground-pilosity small to minute on cephalic dorsum, smaller than the hairs lining the upper scrobe margins.

Flagellate hairs absent from head.

Dorsum of head with 6 standing hairs, arranged in a row of 4 transversely close to the occipital margin, and a more anteriorly situated pair at or close to the highest point of the vertex.

Resembling these very closely are the three species *pretoriae*, *shaula* and *dromoshaula*, which conform to the above characterization but have the upper scrobe margins diverging posteriorly almost in a straight line. In *pretoriae* the eyes are very large and the pronotal humeri lack the flagellate hairs shown in the other two. Completing the *faurei*-complex is a cluster of seven species which shows a gradual reduction and loss of the preocular notch and ventral preocular impression whilst retaining the other characters listed above. Of these seven *relahyla, dyshaula, xenohyla* and *totyla* show a small preocular notch; *adrasora* and *rukha* have the notch vestigial to absent, variably developed even in a single series; absent in *ettillax*. Also in these seven a tendency to broaden and flatten the antennal scapes is shown, perhaps best developed in *xenohyla*.

Closely related to the 13 species of the *faurei*-complex is a species-pair consisting of *bernardi* and *vazerka* which, whilst retaining most of the listed characters, have narrowed the head and lengthened the mandibles and scapes beyond the range shown by the *faurei*-complex, thus.

	CI	MI	SI
faurei-complex	70–83	40–54	59–77
bernardi + *vazerka*	65–72	50–65	79–92

In the *rogeri*-complex (*cacaoensis, londianensis, sarissa, rogeri*) the upper scrobe margins lack a bordering lamina, are strongly pinched in behind the frontal lobes and are concave to deeply indented above the eyes. The scapes are long and slender. *S. rogeri* forms an intermediate stage between the generalized condition shown in the *faurei*-complex and the more strongly modified remaining members of the *rogeri*-complex both in terms of the condition of the upper scrobe margin and in the dentition. In *rogeri* the mandibles are armed as defined above, but in *cacaoensis, sarissa* and *londianensis* intercalary teeth are present at least in the left apical fork, and the preapical teeth are modified. In *cacaoensis* the proximal preapical teeth are reduced, at most as large as the distals and usually smaller. In *sarissa* and *londianensis* the left mandible has lost its distal preapical tooth. The cephalic ground-pilosity in *rogeri* is as in *faurei* and its allies, whereas in the remaining species of the *rogeri*-complex the hairs lining the upper scrobe margins are no broader than the ground-pilosity of the dorsum.

Perhaps derived from the *rogeri*-complex the five species of the *scotti*-complex (*scotti, hastyla, zandala, murshila, helytruga*) lack a lamina on the upper scrobe margin, have elongate cylindrical scapes (SI 75–95), and have the hairs lining the upper scrobe margins slender, not or only fractionally larger than the cephalic ground-pilosity. The mandibles are as defined for the *faurei*-complex but the preocular notch is vestigial or absent and there is no ventral preocular impression in the head. The eyes are relatively large in the first three species listed but are much reduced in *murshila* and *helytruga*.

The 15 species of the *arnoldi*-complex themselves show a wide range of adaptations but appear to be derived as a unit from ancestral forms related to *relahyla* and *ettillax* in the *faurei*-complex. In the *arnoldi*-complex all species lack a preoccular notch and ventral preocular impression, have the eyes very small or vestigial (much smaller than the maximum width of the scape), and show the development of conspicuous scale-like cephalic ground-pilosity. Within the complex *havilandi* and *korahyla* have retained the relatively long mandibles of the ancestral *faurei*-complex and have increased the scape length, so that their respective indices are MI 45–50, SI 80–90, as opposed to MI 26–45, SI 52–75 in the remainder of the *arnoldi*-complex. The central species of the complex, represented by *arnoldi, bitheria, omalyx, traegaordhi, mesahyla, stygia* and *nimbrata*, retain the mandibular dentition described for *faurei* but in *dextra, paranax*

and *katapelta* the distal preapical tooth of the left mandible has been lost, and in *irrorata* the distal preapical tooth of the right mandible is also missing. In all these species the antennal scapes tend to be dorsoventrally flattened and have the leading edge arched convex. This character is taken to extremes in *tetraphanes* where the leading edge of the scape is massively expanded into a forward pointing lobe. In the *arnoldi*-complex in general there is an irregular trend towards broadening the head and shortening the mandibles as one moves away from the species closest to the *faurei*-complex, as follows.

	CI	MI
havilandi + *korahyla*	67–74	45–50
dextra + *paranax*	70–77	37–41
omalyx + *stygia*	74–84	35–41
spathoda + *tetraphanes*	77–97	26–37

It is certain that *Quadristruma emmae* represents a continuation of this trend (CI 80–85, MI 26–32), further specialized by the development of cephalic orbicular hairs and the loss of the two smallest funicular segments (numbers 2 and 3) so that the antennae have only 4 segments in all (Fig. 67). This last specialization is not shown in the species listed above, but in *nimbrata* funicular segments 2 and 3 are vestigial and often difficult to discern.

Finally the *marleyi*-complex (*marleyi* and *pallestes*), although related to the above and most probably developed from them, has a striking overall convergence to the members of the Oriental and Indo-Australian *lyroessa*-group (see Brown, 1948). As in the *arnoldi*-complex the preocular notch and ventral preocular impression are absent in the *marleyi*-complex, and the scale-like pilosity is also present on the head. The eyes, however, are relatively larger in *marleyi* and *pallestes* and the mandibular basal areas are much broadened and have an accentuated basal-external angle. Additional teeth have developed on the mandibular apical fork, growing from the ventral base of the lower spiniform fork tooth. The preapical mandibular armament is as in the *faurei*-complex. Both members of this complex are arboreal, a feature shared only with *cacaoensis* in the Afrotropical fauna.

List of Afrotropical *Strumigenys*

***rogeri*-group**
- ***adrasora* sp. n.**
- ***arnoldi*** Forel
- ***bernardi*** Brown
- ***bitheria* sp. n.**
- ***cacaoensis*** Bolton
- ***dextra*** Brown
- ***dromoshaula* sp. n.**
- ***dyshaula* sp. n.**
- ***ettillax* sp. n.**
- ***faurei*** Arnold **sp. rev.**
- ***hastyla* sp. n.**
- ***havilandi*** Forel
- ***helytruga* sp. n.**
- ***irrorata*** Santschi
- ***katapelta* sp. n.**
- ***korahyla* sp. n.**
- ***londianensis*** (Patrizi)
- ***marleyi*** Arnold
- ***mesahyla* sp. n.**
- ***murshila* sp. n.**
- ***nimbrata* sp. n.**
- ***omalyx* sp. n.**
- ***pallestes*** Bolton
- ***paranax* sp. n.**
- ***petiolata*** Bernard **sp. rev.**
- ***pretoriae*** Arnold
- ***relahyla* sp. n.**
- ***rogeri*** Emery
  - *incisa* Godfrey
  - *sulfurea* Santschi
- ***rufobrunea*** Santschi
- ***rukha* sp. n.**
- ***sarissa* sp. n.**
- ***scotti*** Forel
- ***shaula* sp. n.**
- ***spathoda* sp. n.**
- ***stygia*** Santschi
- ***tetraphanes*** Brown
- ***totyla* sp. n.**
- ***traegaordhi*** Santschi
- ***vazerka* sp. n.**
- ***xenohyla* sp. n.**
- ***zandala* sp. n.**

Key to species (workers)

1 Preocular notch present; the ventrolateral margin of the head impressed, notched or indented immediately in front of the eye, even if only feebly so (Figs 49–58, 71–74) 2
– Preocular notch absent; the ventrolateral margin of the head continuous to the anterior margin

of the eye, without trace of an impression, notch or indentation immediately in front of the eye (Figs 59–66, 75–77) 21
2 Blade of left mandible with 1 preapical tooth 3
– Blade of left mandible with 2 preapical teeth 5
3 Apical fork of left mandible without an intercalary small tooth between the spiniform fork teeth. Small species with relatively slightly longer mandibles, HW 0·36–0·41, MI 55–65. (Cameroun, Gabon, Zaire, Angola) .... ***bernardi*** (part, p. 366)
– Apical fork of left mandible with an intercalary small tooth between the spiniform fork teeth (Fig. 50). Larger species with relatively slightly shorter mandibles, HW 0·50–0·70, MI 51–55 4
4 Pronotal humeri with straight feebly clavate stout hairs, the anterior pronotal margin without a second pair of hairs between the humeral pair. Propodeum without sharp teeth. Leading edge of scape with hairs on the proximal half directed basally (except for the 2 basalmost), hairs on the distal half directed apically. (Kenya) .... ***londianensis*** (p. 377)
– Pronotal humeri with fine flagellate hairs and the anterior pronotal margin with a second pair of stouter hairs between the humeral pair. Propodeum with sharp teeth. All hairs on leading edge of scape directed apically (Fig. 50). (Zaire, Rwanda, Burundi) .... ***sarissa*** (p. 390)
5 Apical fork of left mandible with a strong intercalary tooth and a denticle between the spiniform fork teeth (Fig. 49). With the head in full-face view the upper scrobe margin strongly notched above the eye. Large species, HW >0·60, with the preapical teeth about equal in size or the distal larger than the proximal. (Ghana, Nigeria) .... ***cacaoensis*** (p. 367)
– Apical fork of left mandible without intercalary tooth or denticle between the spiniform fork teeth. With the head in full-face view the upper scrobe margin continuous above the eye. Smaller species, HW <0·60, with the proximal preapical tooth larger than the distal 6
6 Preocular notch on each side continued onto the ventral surface of the head as a transverse impression or groove of varying length, which runs towards but does not reach the midline; this impression situated behind the post-buccal groove or impression and independent of it (Figs 71, 72) 7
– Preocular notch on each side not continued onto the ventral surface of the head, the ventral surface convex and without impressions behind the post-buccal groove or impression (Figs 73, 74) 15
7 Antennal scapes relatively long, SI 79–92 8
– Antennal scapes relatively short, SI 64–74 10
8 Mandibles more or less straight in full-face view, not conspicuously bowed outwards (Fig. 51). Larger species, HW 0·42–0·52. (Cosmopolitan tramp species, very widespread in Afrotropical region) .... ***rogeri*** (p. 387)
– Mandibles conspicuously bowed outwards in full-face view (Fig. 52). Smaller species, HW 0·36–0·41 9
9 Dorsum of propodeum densely reticulate-punctate and dull. (Cameroun, Gabon, Zaire, Angola) .... ***bernardi*** (part, p. 366)
– Dorsum of propodeum smooth and shining. (Ivory Coast, Ghana, Nigeria) .... ***vazerka*** (p. 397)
10 Eyes very large, their maximum diameter 0·23–0·24×HW or more (Fig. 53). (Botswana, South Africa) .... ***pretoriae*** (p. 385)
– Eyes smaller, the maximum diameter less than 0·20×HW 11
11 Pronotal humeri without flagellate hairs. (Guinea, Ivory Coast, Ghana, Nigeria, Cameroun, Gabon, Angola, Sudan, Central African Republic) .... ***petiolata*** (p. 384)
– Pronotal humeri with flagellate hairs 12
12 Disc of postpetiole very finely and densely longitudinally superficially sculptured. (South Africa) .... ***faurei*** (p. 371)
– Disc of postpetiole smooth and shining (when clean, frequently the surface with a waxy bloom present) 13
13 Distal preapical tooth of left mandible short and separated from the proximal by a distance which at least is equal to the length of the distal tooth but which is usually much more. (Guinea, Ivory Coast, Togo, Nigeria) .... ***rufobrunea*** (p. 389)
– Distal preapical tooth of left mandible long and separated from the proximal by a distance which is distinctly much less than the length of the distal tooth 14
14 Extension of preocular notch on ventral surface of head forming a parallel-sided groove which is narrower than the maximum diameter of the eye; the edges of the groove sharply defined. (Zimbabwe) .... ***shaula*** (p. 392)
– Extension of preocular notch on ventral surface of head forming a broad dish-like impression

which is at least as broad as the maximum diameter of the eye and usually broader; the edges of this impression are rounded and not sharply defined. (Burundi) .... ***dromoshaula*** (p. 369)

15 Eyes small, with only 8 ommatidia. Mandibles in full-face view with outer margins of blades straight. Antennal scapes with SI 79. (Angola) .... ***helytruga*** (p. 374)

– Eyes larger, with more than 8 ommatidia. Mandibles in full-face view with outer margins of blades convex, the mandibles usually bowed outwards. Antennal scapes with SI 65–77 16

16 Pronotal humeri without flagellate hairs. (Cameroun) .... ***totyla*** (p. 395)

– Pronotal humeri with flagellate hairs 17

17 In full-face view the projecting hairs on the leading edges of the scapes large and broadly spoon-shaped, about equal in size to the large broadly spoon-shaped hairs fringing the upper scrobe margins. Upper scrobe margins with a broad lamellate rim or flange (Fig. 54). (Cameroun, Zaire) .... ***xenohyla*** (p. 398)

– In full-face view the projecting hairs on the leading edges of the scapes slender, either distinctly narrower than those fringing the upper scrobe margins or with the hairs in both places conspicuously slender, spatulate to narrowly elongate spoon-shaped. Upper scrobe margins with a narrow rim or flange 18

18 In profile the area of the ventral postpetiolar spongiform lobe conspicuously much less than the visible area of the postpetiolar disc (Fig. 68). Infradental lamellae of propodeum very narrow or vestigial, the teeth free or nearly free of the lamellae. (Rwanda, Burundi) ***adrasora*** (part, p. 364)

– In profile the area of the ventral postpetiolar spongiform lobe equalling or exceeding the visible area of the postpetiolar disc. Infradental lamellae of propodeum broad, engaging half or more of the length of the teeth 19

19 With the postpetiole in dorsal view spongiform material is visible projecting laterally at and in front of the midlength of the disc. (Uganda, Kenya) .... ***rukha*** (part, p. 389)

– With the postpetiole in dorsal view projecting spongiform material is restricted to the apices of the posterior transverse strip and does not occur in front of the midlength of the disc 20

20 Basigastral costulae sparse and forming a continuous row across the tergite, without a broad clear central area and usually without secondary fine costulae arising some distance behind the basal strip of the tergite. Scapes shorter, SI 65–69. Occipital margin broadly and shallowly impressed (Fig. 57). (Cameroun, Zaire, Angola) .... ***relahyla*** (p. 386)

– Basigastral costulae dense and very obviously radiating from each side of a broad clear central area, with secondary fine costulae present which arise some distance behind the basal strip of the tergite. Scapes longer, SI 70–74. Occipital margin narrowly and deeply impressed (Fig. 55). (Zimbabwe) .... ***dyshaula*** (p. 370)

21 Blade of left mandible with 1 preapical tooth 22

– Blade of left mandible with 2 preapical teeth 25

22 Blade of right mandible with 1 preapical tooth. (Zimbabwe, South Africa) .... ***irrorata*** (p. 375)

– Blade of right mandible with 2 preapical teeth 23

23 Apical fork of left mandible with an intercalary denticle between the spiniform teeth. Dorsum of head without a transverse row of 4 standing hairs close to the occipital margin. Head broad, CI 85–90 (Fig. 61). (Burundi, Kenya) .... ***katapelta*** (p. 375)

– Apical fork of left mandible without an intercalary denticle between the spiniform teeth. Dorsum of head with a transverse row of 4 standing hairs close to the occipital margin and with a pair situated anterior to this row. Head narrower, CI <80 24

24 Pronotal humeri each with a straight stout thickly clavate projecting hair. (Cameroun, Gabon) ***paranax*** (p. 383)

– Pronotal humeri each with a long fine flagellate projecting hair. (Cameroun, Gabon, Angola, Central African Republic, Uganda) .... ***dextra*** (p. 368)

25 Ventral tooth of left mandibular apical fork with an adventitious tooth and an intermediate denticle arising from its ventrobasal surface (Fig. 59). Sides of alitrunk densely reticulate-punctate everywhere. Arboreal species 26

– Ventral tooth of left mandibular apical fork without additional teeth arising from the ventrobasal surface or at most with an extremely minute denticle-like point at the extreme base. Sides of alitrunk usually with at least the pleurae smooth and shining, not densely reticulate-punctate everywhere 27

26 Pronotal humeri each with a stout straight laterally directed hair which is clavate apically. Petiole node weakly transversely striate dorsally. (Ghana, Nigeria) .... ***pallestes*** (p. 383)

– Pronotal humeri without projecting hairs of any description. Petiole node punctate dorsally. (South Africa) .... ***marleyi*** (p. 378)

27 Pronotal humeri without flagellate hairs 28
– Pronotal humeri with flagellate hairs 31
28 Leading edge of antennal scape grossly expanded into an enormous anteriorly projecting lobe (Fig. 60). (Uganda, Cameroun, Gabon) .... ***tetraphanes*** (p. 395)
– Leading edge of antennal scape not expanded into a gross projecting lobe 29
29 Antennal scape broadest close to the base, thereafter evenly tapering to the apex (Fig. 64). Mandibles and scapes longer, head narrower, MI 48–50, SI 82–85, CI 67–71. (Cameroun) ***korahyla*** (p. 376)
– Antennal scape broadest at or just beyond the midlength, narrowing both proximally and distally (Fig. 63). Mandibles and scapes shorter, the head broader, MI 35–41, SI 65–75, CI 74–84 30
30 Postpetiolar disc smooth and shining. (Zimbabwe, Kenya) .... ***arnoldi*** (p. 365)
– Postpetiolar disc sculptured. (Kenya) .... ***omalyx*** (p. 382)
31 Funicular segments 2 and 3 vestigial and difficult to see so that the funiculus appears to have only 3 segments altogether. Combined length of funicular segments 2 and 3 less than half the length of segment 4 (the penultimate segment) 32
– Funicular segments 2 and 3 reduced but easily visible, the funiculus distinctly with 5 segments. Combined length of funicular segment 2 and 3 more than half the length of segment 4 33
32 Width of lamellate flange bordering upper scrobe margins distinctly greater than the maximum diameter of the eye, approaching the maximum width of the scape. Petiole node in dorsal view as broad as long. (Cameroun) .... ***bitheria*** (p. 367)
– Width of lamellate flange bordering upper scrobe margins distinctly less than the maximum diameter of the eye, only a fraction of the maximum width of the scape. Petiole node in dorsal view much broader than long. (Ivory Coast, Ghana) .... ***nimbrata*** (p. 381)
33 Disc of postpetiole sculptured 34
– Disc of postpetiole smooth and shining (when clean, frequently with a waxy bloom present) 35
34 Ground-pilosity of head, upper scrobe margins and leading edges of scapes of narrow spatulate hairs. Scapes slender and cylindrical, the leading edges not expanded and convex. MI 48, SI 77, CI 76. (Rwanda) .... ***murshila*** (p. 380)
– Ground-pilosity of head, upper scrobe margins and leading edges of scapes of broadly spoon-shaped or scale-like to suborbicular hairs. Scapes flattened, the leading edges expanded and convex. MI 36–40, SI 63–68, CI 80–84. (Kenya, Zimbabwe, Cameroun, Angola) .... ***stygia*** (p. 394)
35 Maximum diameter of eye distinctly much less than maximum width of scape 36
– Maximum diameter of eye at least equal to and usually distinctly greater than maximum width of scape 39
36 Mandibles and scapes very short, MI 26–30, SI 55–61 (Fig. 62). (Ivory Coast, Togo, Cameroun) ***spathoda*** (p. 393)
– Mandibles and scapes longer, MI 42–50, SI 70–90 37
37 Scapes long, SI 80–90. Proximal preapical tooth of left mandible situated close to midlength of the blade so that the distance from the basal midpoint of the tooth to the clypeal margin is less than twice the distance from the basal midpoint of the tooth to the distal base of the dorsal fork tooth (Fig. 65). (South Africa) .... ***havilandi*** (p. 373)
– Scapes shorter, SI 70–75. Proximal preapical tooth of left mandible situated far along the blade so that the distance from the basal midpoint of the tooth to the clypeal margin is more than twice the distance from the basal midpoint of the tooth to the distal base of the dorsal fork tooth 38
38 Dorsum of head with 6 standing hairs. Cephalic ground-pilosity much narrower on the posterior half of the head than on the anterior half, the former narrowly spatulate, the latter spoon-shaped to scale-like. Ventral spongiform lobe of postpetiole at most equal to the exposed area of the postpetiolar disc in profile. (South Africa) .... ***traegaordhi*** (p. 396)
– Dorsum of head with 4 standing hairs. Cephalic ground-pilosity spoon-shaped to scale-like everywhere, not much narrower on the posterior half of the head. Ventral spongiform lobe of postpetiole much larger than the exposed area of the postpetiolar disc in profile (Fig. 69). (Zimbabwe) .... ***mesahyla*** (p. 379)
39 Ventral spongiform lobe of postpetiole in profile distinctly smaller than the exposed area of the postpetiolar disc (Fig. 68). Ventral appendage of petiole not spongiform. (Rwanda, Burundi) .... ***adrasora*** (part, p. 364)
– Ventral spongiform lobe of postpetiole in profile as large as or larger than the exposed area of

the postpetiolar disc. Ventral appendage of petiole spongiform 40

40 Upper scrobe margins fringed by many inconspicuous fine spatulate to narrowly spoon-shaped hairs which are the same size as the hairs of the cephalic ground-pilosity (Fig. 66). Head narrower and scapes longer, CI 64–75, SI 74–95 41

– Upper scrobe margins fringed by few conspicuous broadly spatulate to spoon-shaped large hairs which are distinctly much larger than the minute hairs of the cephalic ground-pilosity. Head broader and scapes shorter, CI 75–81, SI 59–73 43

41 Mandibles and scapes long, MI 46–50, SI 88–95. Petiole node in dorsal view at least as long as broad, often longer than broad. (São Tomé I., Seychelles) .... ***scotti*** (p. 391)

– Mandibles and scapes shorter, MI 42–46, SI 75–82. Petiole node in dorsal view broader than long 42

42 In dorsal view some or all of the hairs on the petiole, postpetiole and base of the first gastral tergite thickened or clavate. Smaller species, HW 0·34–0·39. (Ivory Coast, Nigeria, Cameroun, Gabon, Angola, Burundi) .... ***hastyla*** (p. 372)

– In dorsal view all hairs on the petiole, postpetiole and base of the first gastral tergite simple. Larger species, HW 0·42–0·44. (Annobon I.) .... ***zandala*** (p. 399)

43 Yellow species with longer mandibles and scapes, MI 47–49, SI 67–73. (Uganda, Kenya) ***rukha*** (part, p. 389)

– Blackish brown species with shorter mandibles and scapes, MI 40–43, SI 59–60. (Cameroun) ***ettillax*** (p. 371)

Strumigenys adrasora sp. n.

(Fig. 68)

Holotype worker. TL 2·4, HL 0·60, HW 0·45, CI 75, ML 0·32, MI 53, SL 0·33, SI 73, PW 0·29, AL 0·58.

Mandibles in full-face view evenly shallowly bowed outwards. Apical fork of each mandible consisting of two spiniform teeth, the upper largest, without intercalary teeth or denticles. Each mandibular blade with 2 preapical teeth, the proximal the largest. The distal tooth approximately half the length of the proximal and slightly shorter to about equal in length to the distance separating their bases. Upper scrobe margins not bordered by a projecting flange, the eyes visible in full-face view. Maximum diameter of eye slightly greater than maximum width of scape. Preocular notch present but small and shallow, not continued onto the ventral surface of the head as a transverse impression or groove. Antennal scapes slender, very shallowly curved basally, their leading edges equipped with a row of elongate narrowly spatulate hairs which are curved apically. Upper scrobe margins with an anteriorly curved row of elongate spatulate hairs which are narrow, only fractionally broader than those on the scapes. Dorsum of head with 6 standing hairs arranged in a transverse row of 4 close to the occipital margin and a more anteriorly situated pair. Cephalic ground-pilosity of inconspicuous simple short hairs anteriorly but with the hairs tending to become narrowly spatulate on the occipital lobes. Dorsum of head reticulate-punctate. Pronotal humeri each with a single long fine flagellate hair. Mesonotum with a single pair of standing hairs. Dorsal alitrunk otherwise only with sparse minute ground-pilosity which is appressed. Metanotal groove obsolete, scarcely discernible on the dorsal alitrunk and not impressed in profile. Posterior portion of mesonotum only shallowly depressed behind the level of the standing hairs. Propodeal teeth lamellate and narrowly triangular, the infradental lamella narrow, engaging one-quarter or less of the length of the tooth. Sides of pronotum with faint sculpture anteriorly and posteriorly but smooth medially. Pleurae mostly glassy smooth but with peripheral weak punctulation. Sides of propodeum below the level of the spiracle punctate. Pronotum dorsally very finely longitudinally striolate-costulate, the remainder of the dorsal alitrunk punctate. Petiole node punctate dorsally, the postpetiole mostly smooth but with faint vestiges of shagreening towards the sides. Spongiform appendages of pedicel segments very reduced, the subpetiolar strip vestigial, commencing only at the midlength of the peduncle. Ventral lobe of postpetiole small, in profile distinctly smaller than the exposed portion of the postpetiole and about the same size as the lateral spongiform lobe. In dorsal view the petiole node with a narrow posterior collar, the postpetiole with a narrow posterior strip; the sides in front of the midlength not showing projecting spongiform tissue. Base of first gastral tergite with a narrow lamellate strip from which the basigastral costulae arise. Petiole, postpetiole and first gastral tergite with stout standing hairs, most of which are thickened apically. Colour blackish brown to black.

Paratype workers. TL 2·3–2·4, HL 0·59–0·62, HW 0·44–0·47, CI 73–78, ML 0·30–0·33, MI 50–54, SL 0·33–0·36, SI 72–77, PW 0·29–0·31, AL 0·58–0·62 (10 measured).

As holotype but in some the preocular notch is vestigial and very difficult to see, to all intents and purposes absent. In most the distal preapical tooth is as described above but in a few is distinctly shorter than the distance separating the bases of the two preapical teeth. The subpetiolar spongiform appendage

may be reduced to a small lobe under the node or reduced to a narrow short carina. In a few individuals the propodeal teeth are almost free of the infradental lamellae.

Holotype worker, **Rwanda**: Rangiro, ix.1976 (*P. Werner*) (MHN).
Paratypes. 26 workers with same data as holotype (MHN; MCZ; BMNH; ENSA).
Non-paratypic material examined. **Burundi**: Bujumbura (*A. Dejean*); Bugarama (*A. Dejean*).

The non-paratypic material is lighter than the type-series, being yellowish brown with a dark brown gaster, but otherwise matches the above description. *S. adrasora* belongs to the *faurei*-complex where it is diagnosed by its poorly defined to vestigial preocular impression, reduced spongiform appendages on the pedicel segments and narrow hairs on the upper scrobe margins. The variably developed preocular notch has led me to key this species in two places, firstly amongst the *faurei*-complex members where it really belongs, but secondly amongst the members of the *scotti*-complex towards the end of the key, where its close relatives *rukha* and *ettillax* also occur. *S. adrasora* is separated from all of these forms by its reduced spongiform appendages on the pedicel segments.

Strumigenys arnoldi Forel

Strumigenys arnoldi Forel, 1913*b*: 114. Holotype worker, Zimbabwe: Bulawayo, under stone in nest of *Bothroponera krugeri* (Forel) (*G. Arnold*) (MHN) [examined].
Strumigenys arnoldi Forel; Brown, 1954: 26.

Worker. TL 2·0–2·1, HL 0·54–0·60, HW 0·39–0·46, CI 74–78, ML 0·22–0·23, MI 38–41, SL 0·30–0·32, SI 68–75, PW 0·24–0·26, AL 0·54–0·58 (3 measured).

Mandibles in full-face view broadest near the base and gradually tapering towards the apex. Apical fork of each mandible with 2 spiniform teeth, without intercalary teeth or denticles. Preapical armament of each mandibular blade of 2 teeth, the proximal preapical much longer than the distal and the distance separating their bases less than the height of the distal preapical tooth. Both preapical teeth situated in the apical third of the length of the blade. Upper scrobe margins forming a feeble rim or flange, the eyes not visible in full-face view. Eyes small, the maximum diameter distinctly less than the maximum width of the scape. Preocular notch absent, the ventral surface of the head without a preocular transverse impression or groove on each side. Antennal scapes shallowly curved in the basal third, the leading edges weakly convex and equipped with a row of apically curved spoon-shaped hairs which are about the same size as those fringing the upper scrobe margins. Dorsum of head with dense anteriorly curved hairs which are scale-like to stud-like in full-face view, the upper scrobe margins fringed with similar hairs. Dorsum of head everywhere finely and densely reticulate-punctate. Pronotal humeri without flagellate hairs. Mesonotum with a single pair of stout standing hairs. Ground-pilosity of dorsal alitrunk like that of cephalic dorsum but the hairs tending to be smaller and sparser. Posterior portion of mesonotum depressed, the metanotal groove absent. Propodeal teeth broadly triangular and conspicuous, subtended by broad sinuate infradental lamellae. Sides of alitrunk smooth except for some punctures on the upper portion of the mesopleuron. Entire dorsal alitrunk finely reticulate-punctate, on the pronotum this sculpture overlaid by some fine longitudinal rugulation. Dorsum of petiole node finely punctate, the postpetiolar disc smooth and shining. Spongiform appendages of pedicel segments well developed, the petiole with a broad ventral strip which has its ventral free margin indented before the midlength. Ventral spongiform lobe of postpetiole larger than the exposed area of the postpetiolar disc in profile and distinctly larger than the lateral spongiform lobe. Basigastral costulae short and sparse, widely spaced on each side of a broad central clear area. Petiole, postpetiole and first gastral tergite with stout standing hairs which are swollen to clavate apically. Colour dull yellow.

Within the *arnoldi*-complex the species *tetraphanes, korahyla, arnoldi* and *omalyx* are characterized by lacking pronotal flagellate hairs whilst retaining the usual mandibular dentition of 2 preapical teeth on each blade. Of the four *tetraphanes* is instantly recognized by its short broad head and enormous plate-like lobate extension of the antennal scapes. *S. korahyla* has long narrow mandibles and scapes (MI 48–50, SI 82–85), and has the scapes evenly tapering from base to apex. *S. arnoldi* is separated from *omalyx* by details of sculpture as in the latter the sides of the pronotum and the postpetiolar disc are strongly sculptured, and the reticulate-punctate sculpture of the pronotal dorsum is not overlaid by longitudinal rugulae. In *arnoldi*, on the other hand, the pronotal sides and postpetiolar disc are smooth, and the pronotal dorsum has longitudinal rugulae overlying the reticulate-punctate sculpture.

MATERIAL EXAMINED

Zimbabwe: Bulawayo (*G. Arnold*). **Kenya**: Eldoret (*Patrizi*).

Strumigenys bernardi Brown

Strumigenys new species, Bernard MS; Brown, 1954: 16 (described but not named).
Strumigenys bernardi Brown, 1960: 206. Holotype worker, ZAIRE: 10 miles (16 km) E. of Stanleyville (= Kisangani), iii.1948, no. 2225 (*N. A. Weber*) (MCZ) [examined]

WORKER. TL 1·7–2·1, HL 0·52–0·58, HW 0·36–0·41, CI 67–72, ML 0·30–0·36, MI 55–65, SL 0·30–0·36, SI 82–92, PW 0·22–0·26, AL 0·44–0·54 (25 measured).

Mandibles long and slender, conspicuously bowed outwards in full-face view. Apical fork of both mandibles without intercalary denticles. Left mandible usually with only a single spiniform preapical tooth (the proximal) but extremely rarely a minute almost invisible distal preapical denticle can be seen very close to the dorsal tooth of the apical fork. Right mandible with 2 preapical teeth, the proximal much longer than the distal and the latter frequently concealed by the opposing upper fork tooth when the mandibles are closed. Upper scrobe margins close together immediately behind the frontal lobes, usually feebly sinuate close to the frontal lobes and then evenly divergent behind, not concave or impressed above the eyes and without a conspicuous bordering lamella or flange. Preocular notch strongly developed and deep, the anterior portion of the eye detached from the side of the head. Preocular notch continuing onto ventral surface of head as a transverse impression. Maximum diameter of eye equal to or greater than maximum width of scape. Antennal scapes straight and slender, the leading edge with a row of apically curved narrowly spatulate hairs. Cephalic ground-pilosity of inconspicuous narrowly spatulate hairs which are curved anteriorly. Laterally projecting curved spatulate to spoon-shaped hairs which border the upper scrobe margins distinctly larger than the ground-pilosity. Vertex of head with 6 standing hairs arranged in a row of 4 close to the occipital margin and a more anteriorly situated pair. Dorsum of head finely and shallowly reticulate-punctate everywhere. Pronotal humeri each with a long fine flagellate hair and the mesonotum with a single pair of stout standing hairs. Ground-pilosity on alitrunk minute and appressed. Metanotal groove represented by a transverse line on the dorsum, not or only vestigially impressed in profile. Posterior portion of mesonotum depressed and on same level as propodeum, the latter armed with a pair of triangular teeth subtended by narrow infradental lamellae. Pleurae of alitrunk smooth and shining or at most with faint peripheral punctulae. Sides of propodeum usually punctate, less commonly virtually unsculptured. Pronotal dorsum usually with fine longitudinal rugulae which diverge posteriorly and are superimposed on a punctate ground-sculpture, but one or the other component may be emphasised so that at one extreme the pronotum is punctate dorsally and at the other almost entirely rugulose. Mesonotum and propodeum reticulate-punctate dorsally. Petiole node punctate dorsally, the postpetiole smooth or weakly sculptured, often with feeble longitudinal costulae and sometimes with vestigial punctures. Petiole with a vestigial ventral appendage which at most is represented by a narrow carina, the node posteriorly with a slender transverse collar. Ventral spongiform lobe of postpetiole moderately developed, larger than the lateral lobe in profile. In dorsal view the postpetiole with a very narrow anterior and broader posterior spongiform strip. Base of first gastral tergite with a narrow lamellar strip from which the basigastral costulae arise. Petiole, postpetiole and gaster with strong hairs which are weakly clavate apically. Colour dull yellow.

Among the Afrotropical *Strumigenys* in which the preocular notch is developed *bernardi* and *vazerka* form a close species-pair characterized by their long bowed mandibles, long scapes, lack of intercalary teeth in the mandibular apical forks, and by having the preocular notch continued as an impression on the ventral surface of the head. Most samples of *bernardi* are instantly distinguishable from *vazerka* as the former has only a single preapical tooth on the left mandibular blade whilst the latter has two. However, now and again a specimen of *bernardi* with a minute vestige of the left distal preapical tooth is found, but here *bernardi* is recognized by its reticulate-punctate propodeal dorsum, which in *vazerka* is smooth.

MATERIAL EXAMINED

Cameroun: Nkoemvon (*D. Jackson*); nr Yaounde (*G. Terron*). **Gabon**: Plateau d'Ipassa (*J. A. Barra*); Makokou (*W. H. Gotwald*); Makokou (*I. Lieberburg*). **Zaire**: Ituri Forest (*N. A. Weber*); Stanleyville (*N. A. Weber*). **Angola**: R. Kahingo; R. Chicapa, Saurimo (*L. de Carvalho*); Dundo (*L. de Carvalho*); Camudembele (*L. de Carvalho*); R. Mussungue (*L. de Carvalho*); R. Chinana (*A. Machado*); Salazar (*P. Hammond*).

Strumigenys bitheria sp. n.

HOLOTYPE WORKER. TL 1·9, HL 0·47, HW 0·37, CI 79, ML 0·20, MI 43, SL 0·28, SI 76, PW 0·22, AL 0·47.

Outer margins of mandibles very feebly convex in full-face view, broadest at about the level of the proximal preapical tooth and weakly tapering towards the base. Apical fork of 2 spiniform teeth, without intercalary teeth or denticles. Each mandible with 2 preapical teeth, the proximal of which is the largest and is situated just distal of the midlength of the blade. The distance separating the bases of the preapical teeth is less than the length of the distal preapical tooth. Anterior two-thirds of upper scrobe margins with a very conspicuous broad bordering translucent lamella or flange which is distinctly broader than the maximum diameter of the eye and approaches the maximum width of the scape. Eyes very small, with only 3–4 ommatidia, the maximum diameter of the eye distinctly less than the maximum width of the scape. Preocular notch absent, the ventral surface of the head without a transverse preocular groove or impression on each side. Antennal scapes narrow, slightly curved at the base and broadest at about the midlength, not distinctly flattened nor with the leading edges convex. Hairs fringing the leading edges of the scapes very slender, much smaller than those fringing the upper scrobe margins. Funicular segments 2 and 3 very reduced, vestigial, their combined length less than half that of the fourth (penultimate) funicular segment. Dorsum of head from posterior margin of clypeus to about the midlength densely clothed with broad conspicuous scale-like hairs. Behind this level mediodorsally are only much smaller sparse hairs but towards the sides of the occipital lobes are hairs similar in construction but smaller than those on the anterior half. Upper scrobe margins fringed with large anteriorly curved spoon-shaped hairs. Dorsum of head with 6 standing hairs arranged in a transverse row of 4 close to the occipital margin and a more anteriorly situated pair. Cephalic dorsum reticulate-punctate. Pronotal humeri each with a single fine flagellate hair. Mesonotum with a single pair of stout standing hairs. Ground-pilosity of dorsal alitrunk of small curved hairs. Posterior portion of mesonotum depressed behind the level of the standing hairs. Propodeal teeth triangular, elongate and narrow, longer than their basal width and subtended by narrow infradental lamellae. Sides of pronotum punctate, remainder of sides of alitrunk mostly smooth, with some punctate patches above and below a large smooth central area. Dorsal alitrunk reticulate-punctate, the pronotum also with some fine longitudinal rugulae. Petiole node as long as broad in dorsal view, the surface punctate. Postpetiole smooth. Spongiform appendages of pedicel segments poorly developed, the petiole with a narrow ventral strip and the node with a lateral lobe which is scarcely broader than the posterior collar. Ventral spongiform lobe of postpetiole about equal in size to the exposed area of the propodeal disc in profile. Basigastral costulae very short but stout, arising across the width of the tergite rather than on each side of a central clear area. Petiole, postpetiole and gaster with stout standing hairs which are swollen or thickened apically, colour light brown.

Holotype worker, **Cameroun**: Nkoemvon, 2.iii.1980 (*D. Jackson*) (BMNH).

Closely related to *nimbrata* and sharing the striking reduction of the second and third funicular segments seen in that species, *bitheria* is distinguished by its broad lamellate upper scrobe margins, longer distal preapical teeth, stronger pronotal sculpture, longer narrower propodeal teeth, and by possessing a petiole node which is as long as broad in dorsal view.

Strumigenys cacaoensis Bolton

(Fig. 49)

Strumigenys cacaoensis Bolton, 1971: 59, fig. 1. Holotype worker, paratype workers and female, NIGERIA: Gambari Exp. Sta. (Cocoa Res. Inst. of Nigeria), 10.vii.1969, rot hole in trunk of cocoa tree (*B. Bolton*) (BMNH; MCZ) [examined].

WORKER. TL 2·7–3·3, HL 0·83–0·92, HW 0·72–0·80, CI 86–91, ML 0·38–0·45, MI 44–50, SL 0·48–0·50, SI 62–67, PW 0·36–0·40, AL 0·76–0·88 (11 measured).

Apical fork of left mandible with a dorsally situated small tooth and a ventrally situated denticle between the upper and lower spiniform fork teeth. Apical fork of right mandible with an intercalary denticle only. Preapical armament of both mandibular blades consisting of a pair of teeth or denticles. In general the proximal preapical tooth is very small, reduced to a denticle, and the distal is distinctly larger, but in a few specimens the two are of approximately equal size on each blade. The usual configuration seen in the *rogeri*-group, with the distal preapical tooth distinctly smaller than the proximal, is not found in this species. Upper scrobe margins not bordered by a lamella or flange, narrowly concave and with a pinched-in appearance immediately behind the convex frontal lobes. Posterior to this the upper scrobe margins are evenly divergent then suddenly and deeply excavated above the eye, the site of this excavation directly

above the strongly developed preocular notch so that the two together form a broad deep groove running down the side of the head in front of the eye. Anterior portion of the eye detached from the head and the preocular notch continued onto the ventral surface of the head as a broad transverse impression. Antennal scapes narrow in the basal fifth than broadened, the short curved stout hairs on the leading edge directed apically and broadly spatulate to spoon-shaped. Head reticulate-punctate everywhere, the ground-pilosity of dense short broadly spatulate to scale-like hairs which are curved anteriorly and quite closely applied to the surface, the hairs bordering the upper scrobe margins no longer than those sited elsewhere on the dorsum. Vertex of head without standing hairs of any description. Pronotal humeri without projecting hairs of any description, the mesonotum bearing a single pair of stout hairs which represent the only standing pilosity on the dorsal alitrunk. Ground-pilosity of alitrunk of short sparse spatulate hairs which are closely applied to the surface. Propodeum armed with a pair of acute spines, the infradental lamellae very narrow or vestigial. Sides and dorsum of alitrunk and of pedicel segments reticulate-punctate everywhere, often with a granular appearance on the latter. Metanotal groove shallowly impressed. Spongiform appendages absent from petiole, present on postpetiole as a small ventral lobe and a narrow posterior collar. Transverse basal strip on first gastral tergite reduced to a narrow rim or carina from which the fine basigastral costulae arise. Petiole, postpetiole and gaster with stout hairs which increase in thickness from base to apex. Colour dull yellow to light yellowish brown.

This relatively large species is arboreal, nesting in rot holes in the trunks and branches of trees. It is immediately separated from all its Afrotropical congeners by its unique dentition and strongly excavated upper scrobe margins.

MATERIAL EXAMINED

Ghana: Tafo (*D. Leston*); Tafo (*C. A. Collingwood*); Tafo (*B. Bolton*); Tafo (*A. B. S. King*). **Nigeria**: Gambari (*B. Bolton*).

Strumigenys dextra Brown

Strumigenys dextra Brown, 1954: 27. Holotype and paratype workers, UGANDA: 5 miles (8 km) N. Kamapala, Kawanda Exp. Sta., 15.ii.1949, no. SS 30, soil sample under elephant grass (*G. Salt*) (MCZ) [examined].

WORKER. TL 1·6–1·8, HL 0·41–0·47, HW 0·31–0·34, CI 71–77, ML 0·16–0·19, MI 38–42, SL 0·22–0·25, SI 68–75, PW 0·21–0·24, AL 0·40–0·48 (10 measured).

Mandibles relatively slender, shallowly and evenly curved along the outer margins. Apical fork of each mandible of two teeth, without intercalary teeth or denticles. Preapical armament of left mandible of a single tooth, the right mandible with 2 preapical teeth. Upper scrobe margins concealing the eyes in full-face view. Eyes small, with only 3–5 ommatidia, the maximum diameter of the eye distinctly less than the maximum width of the scape. Preocular notch absent, the ventral surface of the head without a transverse preocular groove or impression on each side. Antennal scape shallowly curved basally, somewhat expanded in the median third, the leading edges with a row of apically curved narrow spoon-shaped hairs. Ground-pilosity of cephalic dorsum reduced, consisting of a few inconspicuous small spatulate hairs. Upper scrobe margins with a triple row of larger narrowly spoon-shaped hairs. Dorsum of head with 6 standing hairs arranged in a transverse row of 4 close to the occipital margin and a more anteriorly situated pair. Pronotal humeri each with a single fine flagellate hair. Mesonotum with a single pair of standing stout hairs which are clavate apically. Ground-pilosity of dorsal alitrunk of inconspicuous narrowly spatulate hairs like those on dorsum of head. In profile the mesonotum feebly or not depressed behind the level of the standing hairs. Propodeal teeth short and subtended by moderately developed infradental lamellae. Sides of pronotum almost smooth to weakly longitudinally rugulose. Pleurae and sides of propodeum smooth except for weak peripheral punctures. Dorsal alitrunk with sparse widely separated longitudinal rugulae on pronotum, the spaces between the rugulae smooth or with vestiges of superficial sculpture. Remainder of dorsal alitrunk reticulate-punctate. Dorsum of petiole node punctate, the postpetiole smooth. Spongiform appendages of pedicel segments only moderately developed. In profile the petiole with a narrow ventral strip and small lateral appendage on the node. Ventral spongiform lobe of postpetiole equal to or slightly smaller than the exposed area of the postpetiolar disc in profile. Basigastral costulae short but sharply defined, arising across the width of the first tergite basally, not radiating on each side of a broad central clear area. Dorsal surfaces of petiole, postpetiole and gaster with stout standing hairs which are narrowly clavate apically. Colour dull yellow.

In the *arnoldi*-complex three other species beside *dextra* have lost the distal preapical tooth of the left mandible, *irrorata, katapelta* and *paranax*. The first of these is distinguished from *dextra*

and the rest by also lacking the distal preapical tooth on the right mandible so that both blades have only a single preapical tooth. *S. katapelta* is the only species of the four which possesses intercalary teeth between the spiniform teeth of the apical forks, and *paranax* is easily separated from *dextra* by its possession of a straight stout projecting hair at the humeri where *dextra* has a long fine flagellate hair present.

Elsewhere in the genus *bernardi, sarissa* and *londianensis* also have only a single preapical tooth on the left mandible, but in all of these there is a large and very distinct preocular notch present.

MATERIAL EXAMINED

Cameroun: nr Yaounde (*G. Terron*). **Gabon**: Ile aux Singes (*J. A. Barra*). **Angola**: Dundo. **Uganda**: Kampala, Kawanda Exp. Sta. (*G. Salt*); Busnia (*N. A. Weber*). **Central African Republic**: Haut Mbomu (*N. A. Weber*).

Strumigenys dromoshaula **sp. n.**

HOLOTYPE WORKER. TL 2·1, HL 0·55, HW 0·41, CI 75, ML 0·27, MI 49, SL 0·29, SI 70, PW 0·27, AL 0·54.

Mandibles in full-face view stout and shallowly bowed outwards. Apical fork of each mandible of 2 spiniform teeth, without intercalary teeth or denticles. Blade of each mandible with 2 preapical teeth, the proximal much the largest in each case and the space separating the preapical teeth shorter than the length of the distal tooth; both preapical teeth situated in the apical third of the length of the blade. Upper scrobe margins bordered by a narrow rim or flange throughout their length, evenly divergent posteriorly and more or less straight rather than sinuate. Eyes of moderate size, the maximum diameter about 0·18×HW. In full-face view the eyes plainly visible and their maximum length distinctly greater than the maximum width of the scape. Preocular notch conspicuous and strongly developed, the anterior portion of the eye detached from the side of the head. Preocular notch extended onto ventral surface of head as a broad impression whose width is about equal to or slightly larger than the maximum diameter of the eye and whose margins are rounded and not sharply defined. Antennal scapes very weakly bent in the basal third and somewhat thickened in the median third, the leading edges with an apically curved row of narrow spoon-shaped hairs. Ground-pilosity of cephalic dorsum consisting of inconspicuous spatulate to spoon-shaped minute hairs, the upper scrobe margins fringed with a row of much larger very distinctive spoon-shaped hairs which are curved anteriorly. Dorsum of head posteriorly with 6 standing hairs arranged in a transverse row of 4 close to the occipital margin and a more anteriorly situated pair. In the holotype this anteriorly situated pair, close to the highest point of the vertex, is flattened to the surface, but erect in the paratypes. Dorsum of head finely and densely reticulate-punctate. Pronotal humeri each with a single fine flagellate hair, the mesonotum with a single pair of stout standing hairs. Ground-pilosity of dorsal alitrunk of minute flattened hairs which are closely applied to the surface. Posterior portion of mesonotum slightly depressed behind the level of the pairs of hairs; metanotal groove forming a line across the surface but not impressed. Propodeal teeth broadly triangular and lamellate, sharply elevated and subtended by narrow infradental lamellae. Sides of pronotum showing vestigial striolate sculpture, the pleurae smooth except for some peripheral punctation, which is best developed on the uppermost parts. Sides of propodeum finely punctate. Pronotal dorsum finely longitudinally rugulose with a few punctures visible laterally but the remainder of the dorsal alitrunk reticulate-punctate. Petiole node faintly punctulate dorsally, the sculpture almost effaced; postpetiole smooth. Spongiform appendages of pedicel segments moderately developed. Subpetiolar process consisting of a thickened cuticular longitudinal ridge which is shallowly concave ventrally and from which a narrowly lunate spongiform strip is dependent. Ventral spongiform lobe of postpetiole larger than lateral lobe, about as large as the exposed area of the postpetiolar disc in profile. In dorsal view the postpetiole node with a broad lamellate strip posteriorly which abuts a similar but narrower strip across the base of the first gastral tergite. Petiole node distinctly broader than long in dorsal view. Basigastral costulae arising from the lamellate strip on each side of a central clear area. Petiole, postpetiole and gaster with stout standing hairs which are somewhat thickened apically. Colour brownish yellow, the gaster dark brown.

PARATYPE WORKERS. TL 2·1, HL 0·54–0·55, HW 0·40–0·41, CI 74–75, ML 0·26–0·27, MI 48–49, SL 0·28–0·29, SI 68–73, PW 0·27, AL 0·52 (2 measured).

As holotype but sides of pronotum may be more obviously striolate.

Holotype worker, **Burundi**: Bugarama, 2200 m, 1976–7, under *Eucalyptus* (*A. Dejean*) (MCZ).

Paratypes. 2 workers with same data as holotype (MCZ; BMNH).

Within the 13 species of the *faurei*-complex six have the preocular notch extended onto the

ventral surface of the head as a transverse groove or impression. Of the six *pretoriae* and *petiolata* lack flagellate hairs at the pronotal humeri. *S. faurei* has the postpetiole sculptured. *S. shaula* is separated from *dromoshaula* by the key character concerning the shape of the ventral extension of the preocular notch, and *rufobrunea* is distinguished by its dental characteristics as the distal preapical tooth is short and widely separated from the proximal.

Strumigenys dyshaula sp. n.

(Fig. 55)

Holotype worker. TL 2·0, HL 0·53, HW 0·40, CI 75, ML 0·25, MI 47, SL 0·28, SI 70, PW 0·26, AL 0·50.

Mandibles in full-face view with the outer margins shallowly convex. Apex of each mandible with a fork of two spiniform teeth, without intercalary teeth or denticles. Preapical armament of 2 teeth on each mandible, situated in the apical third of the length of the blade, the proximal preapical tooth distinctly larger than the distal. Upper scrobe margins evenly divergent posteriorly, shallowly convex and bordered by a thin projecting rim or flange. Eyes visible in full-face view, not wholly hidden by the upper scrobe margins. Preocular notch present but only weakly developed, merely an impression in the side of the head immediately in front of the eyes; the anterior portion of the eye not detached from the side of the head. Preocular notch ending below at the ventrolateral cephalic margin, not extending onto the ventral surface of the head as a transverse groove or impression. Maximum diameter of eye greater than the maximum width of the scape. Antennal scapes very shallowly curved in the basal third, broadest just distal of the midlength, the leading edges with a row of narrow spoon-shaped hairs which are curved apically and are distinctly smaller than those on the upper scrobe margins. Occipital margin of head narrowly and deeply impressed in full-face view. Ground-pilosity of cephalic dorsum consisting of inconspicuous minute spatulate hairs which are closely applied to the surface. Upper scrobe margins with a row of large spoon-shaped hairs which are curved anteriorly and very distinct. Dorsum of head with 6 standing hairs arranged in a transverse row of 4 close to the occipital margin, and a more anteriorly situated pair. Head reticulate-punctate. Pronotal humeri each with a fine flagellate hair. Mesonotum with a single pair of standing hairs. Ground-pilosity of dorsal alitrunk of sparse closely applied hairs similar to those on the head. Posterior portion of mesonotum depressed behind the level of the standing hairs. Metanotal groove forming a line across the dorsum but not impressed in profile. Propodeal teeth triangular and subtended by infradental lamellae. Pleurae mostly smooth, with weak peripheral punctulation which is best developed laterodorsally. Sides of propodeum with a fine punctulate strip above and below the spiracle, otherwise smooth. Sides of pronotum with vestigial striolate and punctulate sculpture. Pronotal dorsum with feeble longitudinal costulae or striae, the remainder of the dorsal alitrunk finely reticulate-punctate. Dorsum of petiole node broader than long and superficially punctate, the postpetiole smooth. Spongiform appendages of pedicel segments moderately developed. In profile the petiole with a shallow ventral process which is about half as deep as the depth of the peduncle at its midlength. Lateral lobe of petiole node bluntly triangular. Ventral and lateral spongiform lobes of postpetiole about equal in size, the former about equal to the exposed portion of the postpetiolar disc in profile. In dorsal view the postpetiole with a lamellar posterior strip which abuts a similar strip traversing the base of the first gastral tergite. Basigastral costulae dense and sharply defined, radiating from each side of a central clear area which is free of costulae. Secondary costulae present which arise between the main costulae, these latter originating on the basal strip and the secondaries arising some distance behind it. Petiole, postpetiole and gaster with stout standing hairs which are broadened to narrowly clavate apically. Colour dull yellow.

Paratype workers. TL 2·0–2·1, HL 0·54–0·56, HW 0·40–0·43, CI 74–78, ML 0·25–0·27, MI 46–48, SL 0·28–0·31, SI 70–74, PW 0·26–0·28, AL 0·50–0·54 (7 measured). As holotype.

Holotype worker, **Zimbabwe**: Victoria Falls, spray forest, rotten wood M440, 7.iii.1969 (*W. L. Brown*) (MCZ).

Paratypes. 8 workers and 1 female with some data as holotype (MCZ; BMNH; MHN).

Of the species possessing a preocular notch and relatively large eyes a number of forms do not have the preocular notch extended onto the ventral surface of the head as a transverse impression. Among the six species in this category *dyshaula* is distinguished by having a postpetiole whose sides are not completely lapped around by spongiform tissue, having the ventral lobe of the postpetiole well developed, having six standing hairs on the cephalic dorsum and having basigastral costulae which do not arise as a regular row across the width of the tergite but rather radiate out from each side of a central clear area.

Strumigenys ettillax sp. n.

HOLOTYPE WORKER. TL 2·0, HL 0·57, HW 0·46, CI 81, ML 0·23, MI 40, SL 0·27, SI 59, PW 0·30, AL 0·52.

Mandibles stout, the outer margins shallowly convex in full-face view and sharply incurved basally where the blades suddenly narrow to their insertions. Apical fork of each mandible with 2 spiniform teeth, without intercalary teeth or denticles. Each mandibular blade with 2 stout preapical teeth, the proximal about one-third longer than the distal and their bases separated by a distance which is slightly less than the length of the distal preapical tooth. Upper scrobe margins very feebly sinuate in full-face view, bordered by a narrow rim or flange and meeting the sides of the occipital lobes (at the scrobal apices) in an obtuse but distinct angle, the upper scrobe margins not merging smoothly into the sides of the occipital lobes. Eyes of moderate size, with 5 ommatidia across the greatest diameter and with 15 or more ommatidia in all. Maximum diameter of eye greater than the maximum width of the scape. Preocular notch absent, ventral surface of head without a transverse preocular groove or impression. Antennal scapes narrow and shallowly curved basally, expanded in the median third and with the leading edges equipped with a row of apically curved spoon-shaped hairs which are distinctly smaller than those fringing the upper scrobe margins. Ground-pilosity of cephalic dorsum of inconspicuous small flattened hairs, the upper scrobe margins with a row of large spoon-shaped hairs. Dorsum of head with 6 standing hairs, arranged in a transverse row of 4 close to the occipital margin and a more anteriorly situated pair. Dorsum of head densely reticulate-punctate. Pronotal humeri each with a fine flagellate hair. Mesonotum with a single pair of stout standing hairs which are thickened apically. Ground-pilosity of dorsal alitrunk of inconspicuous small hairs like those on the head. Posterior portion of mesonotum very slightly depressed behind the level of the pair of hairs, the metanotal groove forming a weak line across the dorsum. Propodeal teeth short and triangular, subtended by relatively broad infradental lamellae which at their broadest extend posteriorly almost as far as the apices of the teeth. Sides of pronotum feebly punctate-striolate, the pleurae and sides of propodeum mostly smooth but with some peripheral punctate sculpture. Pronotum finely and quite densely longitudinally rugulose, the remainder of the dorsal alitrunk reticulate-punctate. Dorsum of petiole node finely punctate, the postpetiole smooth. Ventral spongiform strip of petiolar peduncle narrow, broadening beneath the node. Lateral spongiform lobe of postpetiole equal to or slightly exceeding the exposed area of the disc in profile. In dorsal view the lateral spongiform material is visible, projecting beyond the outline of the sides of the postpetiole. Basigastral costulae sparse, 5–6 arising on each side of a narrow clear central area. Petiole, postpetiole and gaster dorsally with stout standing hairs which are thickened apically. Colour blackish brown.

PARATYPE WORKERS. TL 2·0, HL 0·53–0·54, HW 0·43–0·44, CI 81, ML 0·23, MI 42–43, SL 0·26, SI 59–60, PW 0·27, AL 0·50–0·52 (2 measured).

As holotype but one lighter in colour than the holotype and probably teneral.

Holotype worker, **Cameroun**: nr Yaounde, series IY (*G. Terron*) (ENSA).

Paratypes. 2 workers with same data as holotype but one series AM, the other series TR (ENSA; BMNH).

Strumigenys faurei Arnold sp. rev.

Strumigenys faurei Arnold, 1948: 226, figs 12, 12a. Syntype workers and females, SOUTH AFRICA: Natal, Zululand, Sordwana, 21.v.1946 (*J. C. Faure*) (SAM) [examined]. [Previously synonymized with *rufobrunea* by Brown, 1954: 17.]

WORKER. TL 2·2–2·3, HL 0·55–0·56, HW 0·43–0·44, CI 77–79, ML 0·25–0·26, MI 46–47, SL 0·30–0·32, SI 70–72, PW 0·25–0·27, AL 0·55–0·57 (6 measured).

Outer margins of mandibles shallowly convex, the blades weakly bowed outwards in full-face view. Apical fork of each mandible with 2 spiniform teeth, without intercalary teeth or denticles. Preapical armament of 2 teeth on each blade, the proximal spiniform and much larger than the distal. Length of left distal preapical tooth about equal to the distance separating the bases of the preapical teeth. Upper scrobe margins bordered by a narrow rim or flange, not concealing the eyes in full-face view. Maximum diameter of eye slightly greater than the maximum width of the scape. Preocular notch strongly developed, the anterior portion of the eye detached from the side of the head. Preocular notch continued onto ventral surface of head as a broad shallow impression whose margins are quite sharply defined close to the eye but are more rounded and indistinct elsewhere; the maximum width of the impression the same as or slightly more than the maximum diameter of the eye. Antennal scapes very feebly bent in the basal third, broadest at about the midlength and the leading edges equipped with a row of apically curved spatulate to narrowly spoon-shaped hairs which are distinctly smaller and finer than those on the upper scrobe margins. Ground-pilosity of head of minute spatulate hairs which are curved, inconspicuous and closely applied to

the surface. Upper scrobe margins with a row of projecting large anteriorly curved narrowly spoon-shaped hairs. Dorsum of head with 6 standing hairs arranged in a transverse row of 4 close to the occipital margin and a more anteriorly situated pair. Dorsum of head reticulate-punctate. Pronotal humeri each with a single fine flagellate hair. Mesonotum with a pair of stout standing hairs. Ground-pilosity of alitrunk similar to that on the head but the hairs sparse. Posterior half of mesonotum depressed behind the level of the pair of hairs and with a shallow transverse impression at the base of the slope, behind which the remainder of the mesonotum rises slightly to the level of the propodeum. Metanotal groove forming a transverse line on the dorsum, extremely weakly impressed. Propodeal teeth triangular and subtended by an infradental lamella. Sides of pronotum feebly punctate. Pleurae smooth except for sparse peripheral punctures and a patch on the upper half of the mesopleuron which is punctate. Pronotal dorsum finely longitudinally rugulose with weak punctures between the rugulae posteriorly. Remainder of dorsal alitrunk reticulate-punctate. Petiole node in dorsal view finely punctate, twice broader than long. Postpetiole with the disc finely and densely longitudinally costulate except for the posteromedian area which is smooth. Subpetiolar process reduced to a very thin laminar strip. Ventral spongiform lobe of postpetiole slightly larger than the lateral lobe but smaller than the exposed area of the postpetiolar disc in profile. In dorsal view the postpetiole with a thin transverse laminar strip posteriorly which abuts a similar but even narrower strip across the base of the first gastral tergite from which the fine but sharply defined basigastral costulae arise. Petiole, postpetiole and gaster with standing hairs which are broadened apically. Colour dull yellow.

Close to the West African *rufobrunea* but slightly larger and evenly yellow in colour, *faurei* also differs by having the postpetiole densely costulate, the subpetiolar process very reduced, the petiole node twice broader than long dorsally, and the ventral preocular impression broader and less sharply defined.

Included by Brown (1954) as a synonym of *rufobrunea*, I consider *faurei* to be sufficiently distinct to be regarded as a separate species on the strength of the characters noted above.

MATERIAL EXAMINED

South Africa: Natal, Sordwana (*J. C. Faure*); St Lucia Lake (*J. C. Faure*); Richards Bay (*J. C. Faure*); Dukuduku Forest Res. (*W. L. & D. E. Brown*).

Strumigenys hastyla sp. n.

HOLOTYPE WORKER. TL 2·0, HL 0·52, HW 0·38, CI 73, ML 0·23, MI 44, SL 0·29, SI 76, PW 0·24, AL 0·52.

Mandibles slender in full-face view, the outer margins evenly and very shallowly curved, the blades only slightly tapering from their broadest point near the base to the apex. Apical fork of each mandible with 2 spiniform teeth, without intercalary teeth or denticles. Each mandible with 2 preapical teeth which are stout and situated within the apical quarter of the length of the blade, the proximal tooth slightly longer and thicker than the distal. The preapical teeth on each blade close together so that the length of the distal tooth is more than twice the distance which separates their bases. Upper scrobe margins shallowly divergent and evenly curved, confluent with the sides of the occipital lobes through an even smooth curve in full-face view. Eyes quite large, with about 15 ommatidia, the maximum diameter of the eye distinctly greater than the maximum width of the scape. Preocular notch absent, the ventral surface of the head without a preocular transverse groove or impression on each side. Antennal scapes slender and almost cylindrical, very shallowly curved in the basal third, their leading edges with a row of apically curved slender hairs which are somewhat flattened to very feebly and narrowly spoon-shaped, smaller than the hairs fringing the upper scrobe margins. Cephalic ground-pilosity of numerous narrowly spatulate to slender spoon-shaped hairs, the upper scrobe margins fringed with a row of similar or very slightly larger hairs. Dorsum of head with 6 standing hairs, arranged in a transverse row of 4 close to the occipital margin and a more anteriorly situated pair. Dorsum of head reticulate-punctate. Pronotal humeri each with a single fine flagellate hair. Mesonotum with a single pair of standing hairs. Ground-pilosity of dorsal alitrunk like that of head but the hairs smaller and more widely scattered. Mesonotum shallowly depressed behind the level of the pair of hairs. Propodeal teeth triangular and subtended by conspicuous infradental lamellae. Sides of pronotum weakly rugulose. Pleurae and sides of propodeum mostly smooth but with punctate areas around the periphery. Pronotum dorsally finely longitudinally rugulose, the spaces between the rugulae superficially punctate. Remainder of dorsal alitrunk reticulate-punctate. Dorsum of petiole node reticulate-punctate, the propodeum smooth. Spongiform appendages of pedicel segments well developed, the petiole with a broad ventral strip and a distinct lateral lobe on the node, the postpetiole with large ventral and lateral spongiform lobes. In dorsal view the disc of the postpetiole appears surrounded by spongiform tissue on all sides as the lateral and ventral lobes project beyond the outline of the disc. Basigastral costulae arise on the first tergite on each side of a central clear area. Dorsal surfaces of petiole, postpetiole and gaster with

standing hairs, some or all of which are thickened or flattened apically in dorsal view. Colour brownish yellow.

PARATYPE WORKERS. TL 1·8–2·0, HL 0·49–0·52, HW 0·36–0·38, CI 73–75, ML 0·22–0·23, MI 43–45, SL 0·28–0·29, SI 76–78, PW 0·22–0·24, AL 0·48–0·52 (3 measured). As holotype.

Holotype worker, **Burundi**: Bujumbura, 1977, no. 17 (*A. Dejean*) (BMNH).

Paratypes. 3 workers with same data as holotype (BMNH; MCZ).

Non-paratypic material examined. **Ivory Coast**: Mongaga (*V. Mahnert & J.-L. Perret*); Dropleu (*V. Mahnert & J.-L. Perret*); Man (*V. Mahnert & J.-L. Perret*); Banco Forest (*I. Löbl*); Anguédedou (*W. L. Brown*); Nzi Noua (*W. L. & D. E. Brown*). **Nigeria**: Gambari (*B. Bolton*). **Cameroun**: Victoria (*B. Malkin*); nr Yaounde (*G. Terron*). **Gabon**: Plateau d'Ipassa (*J. A. Barra*). **Angola**: Gubela (*P. Hammond*); Dundo (*L. de Carvalho*). **Burundi**: Imbo Plain (*A. Dejean*).

Variation in this non-paratypic material is as follows. TL 2·0–2·1, HL 0·48–0·54, HW 0·34–0·39, CI 70–74, ML 0·21–0·24, MI 42–46, SL 0·27–0·31, SI 76–82, PW 0·22–0·25, AL 0·48–0·56 (18 measured). The pronotum in some is wholly reticulate-punctate dorsally, the fine longitudinal rugulae seen in the type-series being suppressed. Much of the West African material is darker in colour, medium brown, so that the cephalic ground-pilosity is more conspicuous.

S. hastyla is one of three very closely related species in the *scotti*-complex. Along with *scotti* and *zandala, hastyla* is characterized by the form of the mandibles, the elongate almost cylindrical scapes, the relatively slender fringing hairs on the upper scrobe margins (which are only slightly or not at all larger than the cephalic ground-pilosity), the large eyes, lack of a preocular notch and ventral preocular groove or impression, and evenly rounded sides of the head which round into the upper scrobe margins without trace of an angle. These three species are very similar and difficult to separate. *S. scotti* is the largest of the three and has relatively long mandibles and scapes; it also tends to have the petiole node longer than broad in dorsal view whereas in the other two the node is very obviously broader than long. The measurements compare as follows.

	HL	HW	MI	SI
scotti	0·62–0·70	0·42–0·46	46–50	88–95
zandala	0·59–0·61	0·42–0·44	43–45	75–81
hastyla	0·48–0·54	0·34–0·39	42–46	76–82

As can be seen, *hastyla* is the smallest species of the three in absolute terms. It also differs from *zandala* as the gastral hairs are simple in the latter but mostly flattened or thickened apically in *hastyla*.

Strumigenys havilandi Forel

(Figs 65, 70)

Strumigenys havilandi Forel, 1905: 13. Syntype workers, SOUTH AFRICA: Natal, 5300 ft (1615 m) (*Haviland*) (MHN; BMNH) [examined].

Strumigenys havilandi Forel; Brown, 1954: 25.

WORKER. TL 2·5–2·6, HL 0·62–0·68, HW 0·44–0·50, CI 69–74, ML 0·28–0·33, MI 45–50, SL 0·36–0·40, SI 80–90, PW 0·28–0·32, AL 0·62–0·68 (13 measured).

Mandibles in full-face view slender and almost straight, broadest basally and evenly tapering towards the apex. Apical fork of each mandible with 2 spiniform teeth, without intercalary teeth or denticles. Each mandibular blade with 2 spiniform preapical teeth, the distal only slightly shorter than the proximal and the distance separating their bases distinctly less than the length of the distal preapical tooth. Eyes small, with only 4–5 ommatidia, their maximum diameter much less than the maximum width of the scape. Preocular notch absent, the ventral surface of the head without a transverse preocular groove or impression. Antennal scapes elongate and relatively narrow, SI 80–90, matched only by *korahyla* in the *arnoldi*-complex. The scapes only shallowly and very gently curved, slightly expanded beyond the curve and with their leading edges having an apically directed row of narrow spoon-shaped hairs which are about the same size as those fringing the upper scrobe margins. Ground-pilosity of cephalic dorsum of numerous but inconspicuous narrowly spoon-shaped hairs, the upper scrobe margins fringed by a row of hairs which are the same as those on the dorsum of the head. Occipital margin dorsally with a transverse row of 4 short

curved standing hairs and a pair of similar but even shorter hairs situated anterior to this row. Dorsum of head reticulate-punctate. Pronotal humeri each with a single fine flagellate hair. In this species the hair appears to be very delicate and easily lost by abrasion. Mesonotum with a single pair of standing hairs. Ground-pilosity of dorsal alitrunk of numerous small curved spatulate to spoon-shaped hairs similar to those on the head but slightly smaller. Metanotal groove a transverse line across the dorsum, weakly impressed in profile. Propodeal teeth slender and triangular, subtended by a broad infradental lamella on each side. Sides of alitrunk smooth, with only peripheral punctation present. Pronotal dorsum finely superficially longitudinally rugulose, the rugulae low and inconspicuous, frequently with faint punctures between them. Remainder of dorsal alitrunk finely reticulate-punctate. Petiole node reticulate-punctate dorsally, the postpetiole smooth. Postpetiole distinctly swollen and inflated, subglobular. Spongiform appendages of petiole consisting of a fairly broad ventral strip and a narrow posterior collar. Postpetiole in profile with the lateral lobe much reduced, obviously smaller than the ventral spongiform lobe, and the latter itself relatively small, smaller than the exposed area of the postpetiolar disc in profile. Basigastral costulae short but distinct. Dorsal surfaces of petiole, postpetiole and gaster with standing short hairs which are expanded apically. Colour yellow.

In the *arnoldi*-complex *havilandi* is characterized by its long scapes, the structure of its mandibles and the form of its inflated postpetiole and spongiform appendages. It resembles the two closely related species *traegaordhi* and *mesahyla* but, apart from the mandibular character quoted in the key, may be separated from both by its long scapes and form of the postpetiole and its appendages; compare Figs 69, 70.

MATERIAL EXAMINED

South Africa: Natal (*Haviland*); Natal, Gillitts (*W. L. & D. E. Brown*).

Strumigenys helytruga sp. n.

HOLOTYPE WORKER. TL 2·2, HL 0·59, HW 0·43, CI 73, ML 0·29, MI 49, SL 0·34, SI 79, PW 0·26, AL 0·55.

In full-face view the mandibular blades approximately straight. Apical fork of each mandible with 2 spiniform teeth, without intercalary teeth or denticles. Preapical armament of 2 teeth on each blade, the proximal only fractionally longer than the distal and with both teeth situated in the apical third of the length of the blade. Upper scrobe margins evenly divergent posteriorly and without a bordering rim or flange, posteriorly grading evenly into the sides of the head. Preocular notch vestigially present, represented only by a feeble indentation of the ventrolateral margin immediately in front of the eye, the notch not extended onto the ventral surface of the head as a transverse groove or impression. Eye relatively small, about 0·12×HW and with 8 ommatidia, the maximum diameter of the eye about equal to the maximum width of the scape or fractionally larger. Antennal scapes slender and roughly cylindrical, shallowly curved basally and with their leading edges equipped with a row of apically curved narrow spatulate hairs. Ground-pilosity of head consisting of quite dense conspicuous spatulate hairs which are broader than those on the leading edges of the scapes. Upper scrobe margins without larger hairs but fringed with spatulate hairs the same size and shape as those on the dorsum. Elongate standing hairs on cephalic dorsum restricted to a single pair situated close to the midline near the occipital margin. Dorsum of head reticulate-punctate. Pronotal humeri each with a single fine flagellate hair. Mesonotum with a single pair of standing stout hairs. Ground-pilosity of dorsal alitrunk of sparse narrowly spatulate hairs. Posterior portion of mesonotum shallowly depressed behind the level of the hairs. Metanotal groove represented by a feebly impressed line. Propodeal teeth triangular and subtended by conspicuous infradental lamellae. Sides of alitrunk mostly smooth but with some punctate sculpture dorsally and posteriorly. Pronotal dorsum longitudinally sparsely rugulose, with feeble superficial punctures between the rugulae. Mesonotum and propodeum densely punctate. Dorsum of petiole node punctate, the postpetiole smooth. In profile the petiole with a well-developed spongiform ventral strip and a narrow lateral lobe. Postpetiole with large ventral and lateral lobes. In dorsal view the petiole node with a broad posterior spongiform strip, the postpetiole with spongiform material projecting beyond the sides and posteriorly with a laminar transverse strip connecting the spongiform lateral lobes. Transverse basal strip of first gastral tergite laminar, the basigastral costulae arising from it sharply defined but sparse and short, with only 4 or 5 on each side of a central clear area. Petiole, postpetiole and gaster dorsally with stout standing hairs which are thickened apically. Colour dull brownish yellow.

Holotype worker, **Angola**: Bruco, 26.ii.–2.iii.1972, forest litter (*P. Hammond*) (BMNH).

A member of the *scotti*-complex, *helytruga* is separated from its four close relatives (*scotti, hastyla, murshila* and *zandala*) by its retention of a vestigial preocular notch and relatively very

small eyes. Of the five species only *murshila* has eyes which approach the small size seen in *helytruga*, but here the preocular notch is absent, the mandibles are conspicuously bowed outwards, the cephalic dorsum has six standing hairs, the postpetiole is sculptured and the distal preapical tooth of the left mandible is less than half the length of the proximal.

Strumigenys irrorata Santschi

Strumigenys irrorata Santschi, 1913*a*: 257 (diagnosis in key). Holotype worker, South Africa: Natal, Zululand, Lake Sibayi (*I. Trägårdh*) (NMB) [examined].
Strumigenys irrorata Santschi; Santschi, 1914*c*: 29, fig. 5 (description).
Strumigenys irrorata Santschi; Brown, 1954: 33.

Worker. TL 1·9–2·1, HL 0·47–0·54, HW 0·38–0·43, CI 76–83, ML 0·19–0·23, MI 40–43, SL 0·24–0·28, SI 62–70, PW 0·24–0·27, AL 0·50–0·56 (10 measured).

Apical fork of each mandibular blade with 2 spiniform teeth, without intercalary teeth or denticles. Preapical armament of a single spiniform tooth on each blade which corresponds to the proximal preapical tooth in related species; the distal preapical teeth lost. Upper scrobe margins strongly divergent behind the frontal lobes, the eyes not visible in full-face view. Eyes very small, conspicuously much smaller than the maximum width of the scape. Preocular notch absent, the ventral surface of the head without a preocular transverse groove or impression. Scapes short, weakly curved, their anterior margins shallowly convex and equipped with a row of short spoon-shaped to scale-like hairs. Ground-pilosity of cephalic dorsum of dense short spoon-shaped hairs which are broad and appear scale-like in full-face view. Hairs fringing the upper scrobe margins the same as those on the dorsum, and about equal in size to the projecting hairs on the leading edges of the scapes. Dorsum of head with 6 standing hairs, arranged in a transverse row of 4 close to the occipital margin and a more anteriorly situated pair. Dorsum of head densely reticulate-punctate. Pronotal humeri each with a single long fine flagellate hair. Mesonotum with a single pair of stout standing hairs which are weakly clavate apically. Ground-pilosity of dorsal alitrunk of sparse small hairs which are spatulate to narrowly spoon-shaped. Propodeal teeth subtended by broad infradental lamellae. Metanotal groove not impressed. Sides of alitrunk mostly smooth, sometimes with vague traces of sculpture on the pronotal sides and usually with weak punctulae on the pleurae and propodeum. Pronotal dorsum longitudinally rugulose, the rest of the dorsal alitrunk punctate. Dorsum of petiole node punctate, the postpetiole smooth and shining. Spongiform appendages of pedicel segments well developed, the petiole with a broad ventral spongiform strip and the postpetiole with large ventral and lateral lobes. Basigastral costulae short but sharply defined. Dorsal surfaces of petiole, postpetiole and gaster with stout standing hairs which are weakly clavate apically. Colour medium to dark brown.

Immediately recognized by its unique (in Africa) preapical dentition, *irrorata* is the only member of the *rogeri*-group having a single preapical tooth on each mandibular blade. The usual count in the group is 2 preapical teeth on each blade but a few species have one left and two right preapical teeth.

Material examined

Zimbabwe: Umtali, Melsetter (*R. Mussard*). **South Africa**: Natal, Lake Sibayi (*I. Trägårdh*); Gillitts, nr Durban (*W. L. &. D. E. Brown*); Town Bush, nr Pietermaritzburg (*W. L. & D. E. Brown*).

Strumigenys katapelta sp. n.

(Figs 61, 76)

Holotype worker. TL 2·1, HL 0·51, HW 0·46, CI 90, ML 0·20, MI 39, SL 0·27, SI 59, PW 0·27, AL 0·56.

Mandibles short and conspicuously bowed outwards in full-face view. Apical fork of each mandible consisting of a long spiniform tooth dorsally, a smaller spiniform tooth ventrally and an intercalary denticle between the two longer teeth. Blade of left mandible with a single long spiniform preapical tooth, the proximal; right mandible with a similar proximal preapical tooth and with a very small distal preapical tooth also present. Head broad, the upper scrobe margins strongly divergent and the eyes not visible in full-face view. Eyes small, with only 3–4 ommatidia, their maximum diameter distinctly much less than the maximum width of the scape. Preocular notch absent, the ventral surface of the head without a preocular transverse groove or impression. Antennal scapes short and curved, their anterior margins flattened and expanded in the median third, broadest at the midlength; their convex leading edges with a row of shallowly spoon-shaped to flattened large broad hairs. Cephalic ground-pilosity of inconspicuous short stubby flattened hairs which are closely applied to the surface; without the scale-like or broadly

spoon-shaped hairs usually seen in the *arnoldi*-complex. Upper scrobe margins fringed by similar small hairs, these hairs distinctly very much smaller than those on the leading edges of the scapes. Dorsum of head with a row of 4 standing hairs close to the occipital margin, without a further pair of hairs situated close to the highest point of the vertex. Dorsum of head reticulate-punctate. Pronotal humeri without flagellate hairs, instead each with a projecting straight stout hair which is thickened and flattened apically, directed laterally and slightly elevated. Mesonotum with a single pair of stout standing hairs. Ground-pilosity of dorsal alitrunk of small hairs similar to those on the head. Metanotal groove represented by a line across the dorsum. Propodeal teeth short and triangular, subtended by infradental lamellae whose free margins are concave. Sides of alitrunk smooth except for weak punctures around the periphery. In dorsal view the pronotum sharply marginate anteriorly, weakly longitudinally rugulose and with feeble punctures between the rugulae. Mesonotum reticulate-punctate. Propodeal dorsum smooth anteriorly but punctate posteriorly and between the teeth. Dorsum of petiole node almost smooth, with only the faintest vestiges of reticular patterning; postpetiole smooth. Spongiform appendages of pedicel segments well developed. The petiole in profile with a ventral strip and triangular lateral lobe. Postpetiole with large ventral and lateral spongiform lobes, the former larger than the exposed area of the postpetiolar disc in profile. In dorsal view the disc of the postpetiole surrounded on all sides by projecting spongiform tissue. Basigastral costulae short but sharply defined. Petiole, postpetiole and gaster dorsally with stout standing hairs. Colour brownish yellow.

PARATYPE WORKERS. TL 2·0–2·2, HL 0·50–0·53, HW 0·44–0·46, CI 88–90, ML 0·20–0·21, MI 38–40, SL 0·26–0·27, SI 57–60, PW 0·25–0·28, AL 0·54–0·56 (4 measured). As holotype.

Holotype worker, **Burundi**: Bujumbura, 1977, no. 42 (*A. Dejean*) (BMNH).

Paratypes. 4 workers with same data as holotype (BMNH; MCZ).

Non-paratypic material examined. **Kenya**: Embu, Kirimiri Forest W. of Runyenje (*V. Mahnert & J.-L. Perret*); Mau Forest (*V. Mahnert & J.-L. Perret*).

The non-paratypic material from Kenya answers to the description of the holotype but shows the following size range. HL 0·52–0·55, HW 0·43–0·48, CI 85–87, ML 0·20–0·23, MI 38–41, SL 0·26–0·30, SI 58–63 (5 measured).

The *arnoldi*-complex has only four species in which the distal preapical tooth of the left mandible has been lost, *katapelta, irrorata, dextra* and *paranax*. *S. katapelta* is easily separated from the other three as it is the only species to have an intercalary denticle between the apical fork teeth. Apart from this it separates from *irrorata* as that species has also lost the distal preapical tooth of the right mandible; from *dextra* as that species has flagellate hairs at the pronotal humeri; and from *paranax* as that species is much smaller, with a narrower head and longer antennal scapes.

Strumigenys korahyla sp. n.

(Fig. 64)

HOLOTYPE WORKER. TL 2·3, HL 0·62, HW 0·44, CI 71, ML 0·30, MI 48, SL 0·36, SI 82, PW 0·29, AL 0·60.

Mandibles slender and moderately long, the blades broadening slightly from base to apex in full-face view, not bowed outwards. Apical fork of each mandible of 2 spiniform teeth, without intercalary teeth or denticles. Preapical armament of 2 teeth on each mandible, the proximal tooth about one-third longer than the distal and the distance separating their bases equal to or slightly greater than the length of the distal preapical tooth. Upper scrobe margins bordered by a broad translucent rim or flange, the eyes not visible in full-face view. Eyes very small, with only 4–5 ommatidia, their maximum diameter distinctly less than the maximum width of the scape. Preocular notch absent, the ventral surface of the head without a preocular groove or impression on each side. Antennal scapes long and slender, approximately straight, very narrow in the basal eighth then with the anterior margin suddenly broadened. Beyond this the scape evenly tapering towards the apex. Leading edges of scapes with a series of small apically curved spoon-shaped hairs which are very obviously much smaller than those on the upper scrobe margins. Dorsum of head from the posterior clypeal margin to the midlength with large anteriorly curved shallowly spoon-shaped hairs which appear scale-like in full-face view. Similar but even larger hairs are present fringing the upper scrobe margins. Behind the midlength of the head the hairs of the cephalic ground-pilosity are much smaller and contrast with the larger anterior hairs. Dorsum of head with a transverse row of 4 clavate standing hairs close to the occipital margin, and with a pair of similar but smaller hairs close to the highest point of the vertex (this abraded in the holotype but present in the paratypes). Dorsum of head densely punctate, the

walls of the punctures aligned in places on the occipital lobes and showing as fine rugulae. Pronotal humeri hairless. Mesonotum with a single pair of clavate hairs. Metanotal groove represented by a faint line across the dorsum, extremely weakly impressed in profile. Mesonotum slightly depressed behind the level of the hairs, the base of the declivous portion forming a shallow transverse impression. Propodeal teeth triangular and acute, subtended by narrow infradental lamellae. Sides of pronotum sculptured, remainder of sides of alitrunk smooth except for weak peripheral punctures. Pronotal dorsum longitudinally rugulose, the remainder of the dorsal alitrunk reticulate-punctate. Dorsum of petiole node reticulate-punctate, the postpetiole smooth. Spongiform appendages of pedicel segments moderately developed. In profile the petiole with a straight ventral strip and small lateral appendages. Postpetiole with a small lateral spongiform lobe and a slightly larger ventral lobe, the latter, however, slightly smaller than the exposed area of the postpetiolar disc in profile. In dorsal view the postpetiolar disc about 1·5× broader than the petiole node. Basigastral costulae short and widely spaced, but sharply defined. Dorsal surfaces of petiole, postpetiole and gaster with stout clavate hairs. Colour brownish yellow.

PARATYPE WORKERS. TL 2·2–2·3, HL 0·61–0·64, HW 0·41–0·43, CI 67, ML 0·30–0·32, MI 49–50, SL 0·35–0·36, SI 84–85, PW 0·27–0·28, AL 0·58–0·60 (2 measured). As holotype.

Holotype worker, **Cameroun**: nr Yaounde, series MT (*G. Terron*) (ENSA).
Paratypes. 2 workers with same data as holotype but one series OV, the other series EP (ENSA; BMNH).

Among the species of the *arnoldi*-complex, characterized by their small to minute eyes, lack of a preocular notch and ventral preocular impression, and scale-like cephalic ground-pilosity, only two species have elongate mandibles and scapes. These two, *korahyla* and *havilandi*, compare with the remaining 11 species of the complex as follows.

	MI	SI
havilandi	45–50	80–90
korahyla	48–50	82–85
remainder of *arnoldi*-complex	26–45	52–75

Apart from this *korahyla* is characterized within the *arnoldi*-complex by its complete preapical dentition of 2 teeth on each mandible, lack of intercalary or adventitious teeth in the mandibular apical fork, lack of pronotal flagellate hairs at the humeri, slender antennal scapes and hairs on the leading edges of the scapes which are much smaller than those on the upper scrobe margins.

Strumigenys londianensis (Patrizi)

Proscopomyrmex londianensis Patrizi, 1946: 295, figs 1, 2. Syntype workers, KENYA: Londiani, q. 2260 m.s.m., 4.ix.1943 (*S. Patrizi*); and Mau Forest, 16.i.1946 (*Meneghetti*) (BMNH; MCZ) [examined].
Strumigenys (Proscopomyrmex) londianensis (Patrizi) Arnold, 1948: 227.
Strumigenys londianensis (Patrizi); Brown, 1954: 14.

WORKER. TL 3·5–4·2, HL 0·84–0·92, HW 0·62–0·70, CI 74–77, ML 0·44–0·47, MI 51–52, SL 0·52–0·58, SI 82–87, PW 0·38–0·44, AL 0·82–0·94 (8 measured).

Apical fork of left mandible with a small intercalary tooth between the upper and lower fork teeth; right apical fork without an intercalary tooth. Blade of left mandible with a single spiniform preapical tooth present (the proximal); blade of right mandible with 2 preapical teeth, a larger proximal and a smaller distal tooth which is situated close to the apical fork and may be hidden by the opposing left apical fork when the mandibles are fully closed. Upper scrobe margins not bordered by a continuous projecting lamina, close together on anterior third of head, the eyes clearly visible in full-face view. Upper scrobe margins concave immediately behind the convex frontal lobes, with a pinched-in appearance. Behind this the scrobe margins shallowly concave above the eyes and then diverging posteriorly. Preocular notch deep and strongly developed, the anterior portion of the eyes detached from the side of the head. Preocular notch continued onto the ventral surface of the head as a conspicuous broad transverse impression. Antennal scapes roughly cylindrical, very slightly broadened in the median third and with a characteristic arrangement of strong hairs projecting from the leading edge. The basalmost 1–3 (usually 2) projecting hairs are curved apically, the next 3–4 are curved basally and the distalmost 3–4 are curved apically. Ground-pilosity of head short, broadly spatulate to scale-like everywhere and curved anteriorly. In profile the vertex usually with a single pair of stout standing hairs which are weakly clavate, but these are easily lost by abrasion. Dorsum of head reticulate-punctate. Pronotal humeri each with a long stout straight hair which is

remiform to weakly clavate apically. Mesonotum with a single pair of shorter stout straight hairs which are somewhat more strongly clavate apically; the dorsal alitrunk otherwise without standing pilosity but with sparse narrowly spatulate appressed ground-pilosity. In profile the posterior portion of the mesonotum sharply depressed below the level of the anterior portion and pronotum, forming a single surface with the propodeum. Metanotal groove absent. Propodeum without differentiated angular teeth, instead the infradental lamellae merely bulge slightly and form blunt angles dorsally. Sides of alitrunk mostly punctate but with some smooth shining areas on the pleurae. Dorsal alitrunk predominantly punctate but the pronotum generally with a few posteriorly divergent rugulae superimposed on the punctures. Petiole node weakly punctulate dorsally, the postpetiole generally smooth but sometimes with the weakest vestiges of punctulate sculpture visible Spongiform appendages of petiole represented by a thin ventral strip and a narrow posterior collar on the node. Postpetiole in profile with moderately well-developed ventral and lateral spongiform lobes and in dorsal view with a very narrow anterior and posterior spongiform strip. Basigastral costulae short and sparse, radiating from the narrow basal spongiform strip of the first tergite. Petiole, postpetiole and gaster dorsally with stout strong hairs which are clavate apically. Colour light brown, gaster darker.

A relatively large and easily recognized species, *londianensis* is known only from Kenya. Together with its close relative *sarissa, londianensis* is characterized by its distinctive mandibular dentition, deep preocular notch and detached dye. The only species coming close to *londianensis* and *sarissa* is *bernardi*, but this is a smaller species with relatively long mandibles which lacks intercalary teeth in the apical fork. The other two are separated as follows.

londianensis	*sarissa*
HW 0·62–0·70, HL 0·84–0·92.	HW 0·50–0·60, HL 0·72–0·82.
Some hairs on leading edge of antennal scape curved basally.	All hairs on leading edge of antennal scape curved apically.
Vertex of head in profile with a single pair of stout clavate standing hairs, the cephalic ground-pilosity short and broadly spatulate.	Vertex of head in profile without standing hairs, the cephalic ground-pilosity elongate, dense and narrowly spatulate.
Pronotal humeri with stout straight hairs which are clavate apically.	Pronotal humeri with elongate fine flagellate hairs.
Anterior pronotal margin between the humeral hairs without other standing hairs.	Anterior pronotal margin between the humeral hairs with a pair of stouter standing hairs; rarely with two pairs.
Propodeum without triangular teeth.	Propodeum with triangular teeth.

MATERIAL EXAMINED

Kenya: Londiani (*S. Patrizi*); Nyandura, Njabini (*V. Mahnert & J.-L. Perret*); Mt Elgon Nat. Pk., Koitoboa Peak (*V. Mahnert*).

Strumigenys marleyi Arnold

Strumigenys havilandi race *marleyi* Arnold, 1914: 31, fig. 10. Syntype workers, SOUTH AFRICA: Natal, Durban, ii.1914, 'in nest of *Pheidole punctulata*' (*F. B. Marley*) (SAM) [examined].
Strumigenys marleyi Arnold; Arnold, 1926: 286. [Raised to species.]
Strumigenys marleyi Arnold; Brown, 1954: 24.

WORKER. TL 2·4–2·5. HL 0·62–0·66, HW 0·48–0·50, CI 75–77, ML 0·22–0·24, MI 35–37, SL 0–30–0·32, SI 60–63, PW 0·28–0·31, AL 0·62–0·66 (2 measured).

Mandibles in full-face view broad basally and narrowing to the apex, with an exaggerated basal external angle and with a basal internal rounded lamina, both of which serve to increase the basal width of the blades. Apical fork of left mandible without intercalary teeth but the lower spiniform fork tooth with an adventitious tooth arising from its ventral basal surface which is about half the length of the lower fork tooth, and with a minute denticle between this adventitious tooth and the lower fork tooth. Apical armament of right mandible as left but the minute denticle may be absent. Both mandibular blades with 2 preapical teeth set close to the apex, the proximal of these larger than the distal. Upper scrobe margins shallowly convex and divergent from just behind the frontal lobes. Preocular notch absent. Eyes large, their maximum diameter distinctly greater than the maximum width of the scape. Ventral surface of head without a preocular transverse groove or impression. Antennal scapes weakly curved in the basal third, broadest at about the midlength, the leading edge shallowly convex and with a series of apically curved

spoon-shaped hairs. Dorsal surfaces of scapes with numerous short spatulate to narrowly spoon-shaped hairs present. In full-face view the cephalic dorsum densely clothed with conspicuous short scale-like to spoon-shaped hairs which are curved anteriorly; those hairs bordering the upper scrobe margins no larger than those on the dorsum. Cephalic dorsum without simple standing hairs of any description. Head finely but sharply punctate everywhere. Pronotal humeri without projecting hairs of any description, the mesonotum without standing hairs. Dorsal alitrunk only with short hairs similar to but sparser than those on the head. In profile the pronotum and mesonotum forming a single even convexity, the posterior portion of the mesonotum not suddenly depressed. Metanotal groove present across the dorsum as a very feebly impressed line, the impression visible in profile but extremely shallow and narrow. Propodeal teeth broad, laminar and confluent through most of their length with the broad sinuate infradental lamellae, both the teeth and the laminae appearing reticulate or even spongiform. Entirety of sides and dorsum of alitrunk densely punctate to reticulate-punctate. Spongiform appendages of pedicel segments strongly developed. Ventral appendage of petiole in profile deeper than the depth of the peduncle at its midlength and abruptly truncated posteriorly, the end of the spongiform appendage occurring directly below the highest point of the node. Lateral spongiform lobe of petiole large. Ventral spongiform lobe of postpetiole in profile large, its area distinctly greater than the exposed area of the postpetiolar disc. Lateral postpetiolar lobe almost as large as the ventral. Petiole node punctate dorsally, the postpetiole smooth. Posterior face of petiole node bordered by a translucent lamella. Postpetiolar disc in dorsal view with projecting spongiform tissue present all down the sides, posteriorly with a narrow translucent laminar strip. Base of first gastral tergite with a narrow laminar transverse strip, the basigastral costulae radiating from the lateral portions of this strip, on each side of a central clear area. Petiole, postpetiole and gaster with numerous stout standing hairs which are thickened apically. Colour yellowish brown.

Together with *pallestes, marleyi* forms a close species-pair characterized by their broad-based mandibles, distinctive apical mandibular armament, complete set of preapical teeth, relatively large eyes, absence of a preocular notch and completely reticulate-punctate sides to the alitrunk. The following characters separate the two species.

pallestes	*marleyi*
HW 0·38–0·44, HL 0·52–0·58.	HW 0·48–0·50, HL 0·62–0·66.
Pronotal humeri with a single straight hair which is clavate apically and is directed laterally.	Pronotal humeri without projecting hairs of any description.
Promesonotum at each side bordered by a longitudinal row of 4–5 short clavate standing hairs.	Promesonotum not bordered by a row of standing hairs.
Metanotal groove not impressed.	Metanotal groove feebly impressed.
Dorsum of petiole node weakly transversely striate.	Dorsum of petiole node punctate.
Pronotal dorsum with longitudinal rugular sculpture.	Pronotal dorsum reticulate-punctate, without rugular sculpture.

Strumigenys mesahyla sp. n.

(Fig. 69)

Holotype worker. TL 2·0, HL 0·57, HW 0·41, CI 75, ML 0·25, MI 43, SL 0·32, SI 75, PW 0·26, AL 0·58.

Apical fork of each mandible with 2 teeth, without intercalary teeth or denticles. Preapical armament of 2 teeth on each blade, the proximal longer than the distal and both teeth situated in the apical quarter to third of the length of the blade. Upper scrobe margins bordered by a narrow rim or flange which is broadest behind the frontal lobes and slowly peters out posteriorly; the eyes not visible in full-face view. Eyes very small, with only 4 ommatidia, the maximum diameter of the eye less than the maximum width of the scape. Preocular notch absent, the ventral surface of the head lacking a preocular transverse groove or impression. Scapes relatively slender, only moderately broadened in the median third and evenly shallowly curved in the basal third. Leading edges of scapes with an apically curved row of shallowly spoon-shaped hairs. Ground-pilosity of cephalic dorsum everywhere of broad flattened to spoon-shaped hairs which are curved anteriorly and which appear scale-like in full-face view. These hairs approximately the same size everywhere on the dorsum, not becoming much smaller on the posterior half. Hairs fringing the upper scrobe margins the same shape and size as those on the dorsum. Four stout standing hairs which are thickened apically are present in a transverse row close to the occipital margin; there is no pair of standing

hairs situated anterior to this row. Dorsum of head reticulate-punctate. Pronotal humeri each with a single long flagellate hair, the mesonotum with a single pair of stout standing hairs. Ground-pilosity of alitrunk of sparse scale-like hairs which are similar to those on the head but smaller. Metanotal groove represented by a faint line across the dorsum, the mesonotum sharply depressed behind the level of the pair of hairs. Propodeal teeth narrowly triangular and acute apically, confluent in their basal halves with the shallowly convex broad infradental lamellae. Sides of alitrunk mostly smooth, with vestigial traces of rugular sculpture anteriorly on the pronotum and with scattered peripheral patches of punctures on the pleurae and propodeum. Pronotal dorsum longitudinally rugulose, the remainder of the dorsal alitrunk punctate. Petiole node punctate dorsally, the postpetiole smooth and shining. Spongiform appendages of pedicel segments well developed. In profile the petiole with a broad ventral strip which projects into a lobe below the spiracle, and with a lateral lobe on the node. Postpetiole with large lateral and ventral spongiform lobes, the latter much larger than the exposed area of the postpetiolar disc in profile. Basigastral costulae sparse but quite sharply defined, arising on each side of a broad central clear area. Petiole, postpetiole and gaster with stout standing hairs which are thickened apically. Colour yellow.

Paratype worker. TL 2·1, HL 0·52, HW 0·41, CI 79, ML 0·22, MI 42, SL 0·30, SI 73, PW 0·24, AL 0·54.
As holotype but the infradental lamella of the propodeum not as evenly convex as indicated in Fig. 69 and the ventral spongiform lobe of the petiole more broadly triangular and only narrowly spongiform in front of the lobe.

Holotype worker, **Zimbabwe**: Bulawayo, Hillside, 8.ii.1914, in nest of *Solenopsis* sp. (*G. Arnold*) (BMNH).
Paratype. 1 worker, **Zimbabwe**: Victoria Falls, spray forest, iii.1969 (*W. L. Brown*) (MCZ).

The closest relative of *mesahyla* is *traegaordhi*, known only from South Africa. Details separating the two are tabulated under the latter name.

Strumigenys murshila sp. n.
(Fig. 77)

Holotype worker. TL 2·3, HL 0·58, HW 0·44, CI 76, ML 0·28, MI 48, SL 0·34, SI 77, PW 0·27, AL 0·58.
Mandibular blades slender and shallowly but distinctly bowed outwards in full-face view. Apical fork of each mandible with a pair of spiniform teeth, without intercalary teeth or denticles. Two preapical teeth present on each blade, the proximal longest and the distal tooth on the left mandible slightly smaller than that on the right. Length of left distal preapical tooth about equal to the distance separating its base from that of the proximal preapical tooth. Upper scrobe margins narrow anteriorly, the preocular laminae prominent, strongly divergent and evenly convex posteriorly but without a projecting bordering rim or flange. Eyes only partially visible in full-face view. Eyes very small, with only 5–6 ommatidia, their maximum diameter less than the maximum width of the scape. Preocular notch and ventral preocular transverse impression absent. Antennal scapes slender and more or less cylindrical, very weakly bent near the base where they are slightly narrowed. Leading edges of scapes equipped with a row of apically curved narrow spatulate hairs. Ground-pilosity of cephalic dorsum and hairs bordering the upper scrobe margins the same; hairs approximately the same length and thickness on all parts of the head, curved and narrowly spatulate, conspicuous. Upper scrobe margins without a row of much broader larger hairs which contrast with the ground-pilosity. Dorsum of head with 6 standing hairs, arranged in a transverse row of 4 close to the occipital margin, and a more anteriorly situated pair close to the highest point of the vertex. Dorsum of head sharply reticulate-punctate. Pronotal humeri each with a long fine flagellate hair. Mesonotum with a single pair of stout standing hairs. Sparse ground-pilosity of dorsal alitrunk of slender spatulate hairs which are shorter and narrower than those on the head. Metanotal groove a narrow transverse impression across the dorsum. In profile the anterior mesonotum slightly raised above the level of the posterior pronotum. Posterior portion of mesonotum depressed behind the level of the standing hairs, the metanotal groove impressed and the propodeum raised and convex behind the groove. Propodeal teeth narrowly triangular, the infradental lamellae narrow, confluent with only the basal third or so of the tooth. Sides of pronotum, extreme upper portions of the pleurae and propodeum punctate, the sides of the alitrunk otherwise smooth. Entire dorsal alitrunk reticulate-punctate, the pronotum also with a few weak overlying rugulae which are irregularly longitudinal. Petiole node punctate dorsally, the postpetiole longitudinally costulate-rugulose. Spongiform appendages of pedicel segments strongly developed. In profile the petiole with a curtain-like ventral process, the postpetiole with large lateral and ventral lobes of which the latter is larger than the exposed area of the postpetiolar disc in profile. Disc of postpetiole surrounded on all sides by spongiform material in dorsal view, the lateral spongiform lobes strongly prominent at the sides and the

posterior transverse strip broad. Basal strip of first gastral tergite lamellate spongiform, the basigastral costulae arising from it almost parallel and only weakly directed towards the midline, not conspicuously radiating from the lateral portions of the strip. Petiole, postpetiole and first gastral tergite with standing hairs which are slightly thickened apically. Colour brownish yellow, the gaster somewhat broader than the head and alitrunk.

Holotype worker, **Rwanda**: Rangiro, 10.vii.1973, 1800 m (*P. Werner*) (MHN).

Known only from the holotype *murshila* is nonetheless a very distinctive species of the *scotti*-complex characterized by its cephalic pilosity, small eyes and lack of a preocular notch, sculptured postpetiole and slender antennal scapes.

Strumigenys nimbrata sp. n.

HOLOTYPE WORKER. TL 1·5, HL 0·43, HW 0·31, CI 72, ML 0·18, MI 42, SL 0·22, SI 71, PW 0·20, AL 0·37.

Outer margins of mandibles shallowly convex in full-face view, the blades narrowing basally and broadest at about the midlength. Apical fork of each mandible with 2 spiniform teeth, without intercalary teeth or denticles. Each mandible with 2 preapical teeth, a larger proximal tooth which is situated very close to the midlength of the blade, and a smaller distal preapical tooth which is close to the apical fork. The distance separating the bases of these two teeth is distinctly greater than the length of the distal preapical tooth. Upper scrobe margins with a narrow inconspicuous bordering rim or flange which is distinctly narrower than the maximum diameter of the eye. Eyes small, with only 4 ommatidia, the maximum diameter equal to or slightly less than the maximum width of the scape. Preocular notch absent, the ventral surface of the head without a preocular transverse groove or impression. Antennal scapes slender at the base and very weakly curved, the medial third slightly expanded and the leading edges with a row of apically curved narrow spoon-shaped hairs which are smaller than those fringing the upper scrobe margins. Funicular segments 2 and 3 vestigial and difficult to see, the separation of the two segments almost invisible and the length of segments 2 and 3 together less than half the length of segment 4 (the penultimate segment); under low magnification or in poor light the funiculus appears to consist of only 3 segments rather than the usual 5. Dorsum of head from posterior clypeal margin to about the midlength with conspicuous narrowly spoon-shaped pilosity which is curved anteriorly, and a double to triple row of these hairs border the upper scrobe margins. Behind the midlength the hairs are much smaller and sparser, narrow and inconspicuous; the pilosity of the two areas contrasting strongly. Dorsum of head with 6 standing hairs arranged in a transverse row of 4 close to the occipital margin and a more anteriorly situated pair. Dorsum of head reticulate-punctate. Pronotal humeri each with a single long fine flagellate hair. Mesonotum with a single pair of stout standing hairs. Ground-pilosity of dorsal alitrunk of sparse small hairs which are closely applied to the surface. Metanotal groove a feeble transverse line on the dorsum which is minutely impressed. Dorsum of mesonotum very shallowly concave in profile behind the level of the standing hairs, not sharply depressed. Propodeal teeth small and narrowly triangular, the infradental lamellae very narrow and petering out ventrally, broadest where they join the teeth. Sides of alitrunk unsculptured. Pronotal dorsum very weakly and irregularly longitudinally rugulose, the remainder of the dorsal alitrunk and the petiole node reticulate-punctate. Postpetiole smooth in centre of disc but elsewhere with faint superficial reticulation. Spongiform appendages of pedicel segments much reduced, the peduncle of the petiole with a narrow ventral strip and the lateral lobe of the node minute. Petiole node broader than long in dorsal view. Ventral spongiform lobe of postpetiole smaller than the exposed area of the postpetiolar disc in profile. Basigastral costulae widely spaced and short, but sharply defined. Petiole, postpetiole and gaster with stout standing hairs which are thickened apically. Colour dull yellow to brownish yellow.

PARATYPE WORKERS. TL 1·5–1·8, HL 0·42–0·46, HW 0·31–0·35, CI 72–77, ML 0·17–0·20, MI 40–45, SL 0·22–0·24, SI 68–73, PW 0·19–0·23, AL 0·35–0·43 (12 measured).

As holotype, the eyes with 4–6 ommatidia and the sculpture showing some variation in intensity. The postpetiole may be as described above, or wholly smooth, or even have a few faint longitudinal rugulae towards the outer edges of the disc.

Holotype worker, **Ivory Coast**: Tai Forest, 17.x.1980 (*V. Mahnert & J.-L. Perret*) (MHN).

Paratypes. 31 workers and 1 female with same data as holotype (MHN; BMNH; MCZ; ENSA).

Non-paratypic material examined. **Ivory Coast**: Banco Forest (*I. Löbl*); Banco Forest (*W. L. Brown*); Divo (*L. Brader*); Monogaga (*V. Mahnert & J.-L. Perret*); Tai Forest (*V. Mahnert & J.-L. Perret*); Languededou (*V. Mahnert & J.-L. Perret*); Adiopodoume (*V. Mahnert & J.-L. Perret*). **Ghana**: Tafo (*B. Bolton*).

The size range of the non-paratypic material is HL 0·42–0·48, HW 0·31–0·37, CI 73–77, ML 0·17–0·21, MI 40–44, SL 0·22–0·26, SI 69–71. All this material matches the holotype. *S. nimbrata* is easily diagnosed by its very reduced funicular segments 2 and 3. Other characters aiding its recognition within the *arnoldi*-complex include the cephalic pilosity, position of the proximal preapical teeth and size of the distals, development of the infradental lamellae and spongiform appendages, and minute size. The only other species sharing the character of very reduced funicular segments is *bitheria*, but in this species the flange bordering the upper scrobe margins is very broad, the distal preapical tooth of the mandible is longer, the pronotal dorsum has distinct punctate sculpture between the rugulae, the petiole node is as broad as long in dorsal view and the propodeal teeth are much longer than in *nimbrata*.

Strumigenys omalyx sp. n.

(Fig. 63)

Holotype worker. TL 2·3, HL 0·57, HW 0·45, CI 79, ML 0·23, MI 40, SL 0·31, SI 69, PW 0·26, AL 0·58.

Mandibles in full-face view of approximately the same width to the proximal preapical tooth, not evenly tapering from base to apex. Apical fork of 2 spiniform teeth on each mandible, without intercalary teeth or denticles. Each mandibular blade with 2 preapical teeth, the proximal much longer than the distal in each case. Upper scrobe margins with a narrow bordering rim or flange, the eyes not visible in full-face view. Eyes small, with only 5–6 ommatidia, the maximum diameter of the eye conspicuously much less than the maximum width of the scape. Preocular notch absent, the ventral surface of the head without a transverse preocular groove or impression. Antennal scapes shallowly bent at about the basal third, somewhat dorsoventrally flattened and broadest at about the midlength, their leading edges distinctly convex and equipped with a row of apically curved large spatulate to spoon-shaped hairs which are as large as or slightly larger than those fringing the upper scrobe margins. Dorsum of head in full-face view clothed with broad scale-like to stud-like hairs which do not decrease in size posteriorly on the dorsum. Cephalic dorsum with a transverse row of 4 stout standing hairs close to the occipital margin, without a more anteriorly situated pair close to the highest point of the vertex. Head densely and strongly reticulate-punctate everywhere. Pronotal humeri without flagellate hairs, lacking projecting hairs of any description. Mesonotum with a single pair of stout standing hairs which are broadly clavate apically. Ground-pilosity of dorsal alitrunk of sparse scattered scale-like hairs. Metanotal groove feebly marked across the dorsum but not impressed. Propodeal teeth triangular, broad in profile and confluent for approximately their basal halves with the broad sinuate infradental lamellae. Sides of pronotum densely reticulate-punctate, the pleurae and sides of the propodeum smooth except for peripheral puncturation. Dorsal alitrunk densely reticulate-punctate everywhere, the pronotum not overlaid by longitudinal rugulae. Dorsum of petiole node reticulate-punctate, the postpetiolar disc longitudinally striolate to punctate-striolate, the sculpture denser towards the sides of the disc than at the centre. Spongiform appendages of pedicel segments well developed, the ventral spongiform lobe of the postpetiole larger than the lateral lobe and equal to or slightly larger than the exposed area of the postpetiolar disc in profile. Basigastral costulae arising on each side of a central clear area. Petiole, postpetiole and first gastral tergite with standing stout hairs which are clavate apically. Colour light brown.

Paratype workers. TL 2·0–2·4, HL 0·49–0·60, HW 0·41–0·46, CI 75–80, ML 0·19–0·23, MI 35–40, SL 0·26–0·32, SI 65–71, PW 0·24–0·28, AL 0·49–0·60 (15 measured).

As holotype but in some the postpetiolar disc is more strongly sculptured, the central portion reticulate-punctate and the lateral portions striolate.

Holotype worker, **Kenya**: Tana R., Sankuri, 160 m, 18.x.1977 (*V. Mahnert & J.-L. Perret*) (MHN).

Paratypes. 42 workers and 4 females with same data as holotype (MHN; BMNH; MCZ; ENSA).

Non-paratypic material examined. **Kenya**: Lamu, nr Witu (*V. Mahnert & J.-L. Perret*).

Closest related to *arnoldi* and sharing that species' lack of pronotal flagellate hairs whilst retaining a complete mandibular dentition of 2 preapical teeth on each blade. *S. omalyx* is separated from *arnoldi* by the presence in the former of sculptured pronotal sides and postpetiolar disc, and a lack of longitudinal rugulae on the pronotal dorsum. In *arnoldi* the pronotum is smooth laterally, the disc of the postpetiole is smooth and longitudinal rugulae are present on the pronotal dorsum.

Strumigenys pallestes Bolton

(Fig. 59)

Strumigenys pallestes Bolton, 1971: 62, figs 2, 3. Holotype worker, paratype workers and female, GHANA: Eastern Region, New Tafo, Cocoa Res. Inst. Ghana, mossy rot hole in trunk of cocoa tree, 22.vii.1970 (*B. Bolton*) (BMNH; MCZ) [examined].

WORKER. TL 2·0–2·2, HL 0·52–0·58, HW 0·38–0·44, CI 70–77, ML 0·18–0·21, MI 32–36, SL 0·24–0·26, SI 57–62, PW 0·24–0·30, AL 0·52–0·60 (20 measured).

Mandibles in full-face view broad basally and tapering towards the apices, the inner margin with a large basal lamellate lobe whose apex is directed posteriorly and is concealed by the clypeus when the mandibles are closed. External margins of mandibles with an accentuated basal angle, the blades enclosing a central vacuity at full closure, the vacuity broadest distally and tapering towards the base. Apical fork of each mandible consisting of a pair of spiniform teeth, lacking intercalary teeth or denticles. Ventral margin of lower fork tooth with a smaller adventitious tooth arising near its base, and with a minute denticle present basally between this adventitious tooth and the lower fork tooth. Each mandibular blade with 2 preapical teeth, the proximal the longest. Eyes not visible in full-face view, concealed by the projecting upper scrobe margins. Preocular notch absent, the ventral surface of the head without a preocular groove or impression. Eyes moderate in size, with 5–6 ommatidia in the greatest diameter, their maximum diameter equal to or only fractionally less than the maximum width of the scape. Antennal scapes weakly curved basally, slightly expanded and broadest at about the midlength, their leading edges with a row of curved spoon-shaped small hairs. Dorsum of head densely clothed with short broad flattened hairs which appear scale-like to short spatulate in full-face view, the upper scrobe margins densely fringed by hairs similar in shape and size to those on the leading edges of the scapes. Dorsum of head with a transverse row of 4 short standing hairs close to the occipital margin. Head reticulate-punctate everywhere. Pronotal humeri each with a laterally projecting straight clavate hair. Lateral margins of promesonotal dorsum with a row of 4–5 clavate hairs on each side, the first 1–2 of these curve towards the midline, the remaining 3 are more or less straight. Ground-pilosity of dorsal alitrunk like that on head but the hairs sparser, frequently somewhat smaller and slightly more elevated. Metanotal groove absent. Mesonotum not depressed posteriorly, instead the promesonotum forming a single more or less evenly curved surface in profile. Propodeal teeth subtended by broad convex infradental lamellae. Sides of alitrunk uniformly reticulate-punctate everywhere. Pronotal dorsum longitudinally rugulose, usually with punctures between the rugulae. Remainder of dorsal alitrunk densely reticulate-punctate. Dorsum of petiole node weakly transversely striate, the postpetiole smooth. Spongiform appendages of pedicel segments large, the petiole ventrally with a spongiform strip which is as deep as the peduncle. Ventral spongiform lobe of postpetiole distinctly larger than the exposed area of the postpetiolar disc in profile, and larger than the lateral lobe. In dorsal view the postpetiole narrow, only slightly broader than the petiole. Basigastral costulae dense, radiating on each side of a central clear area. Dorsal surfaces of petiole, postpetiole and gaster with numerous short standing hairs which are clavate apically. Colour dull yellow to brownish yellow.

In the Afrotropical region only *pallestes* and *marleyi* share the strange mandibular shape and odd dentition described above. The characters separating these two species are listed under *marleyi*.

S. pallestes is one of the very few arboreal species of *Strumigenys* known from Africa. All the series listed below were collected from rot holes in tree trunks or branches, or from isolated workers wandering on the bark of a tree.

MATERIAL EXAMINED

Ghana: Tafo (*B. Bolton*); Baudua (*D. Leston*). **Nigeria**: Gambari (*B. Bolton*); Gambari (*B. Taylor*).

Strumigenys paranax sp. n.

HOLOTYPE WORKER. TL 1·8, HL 0·47, HW 0·34, CI 72, ML 0·19, MI 40, SL 0·25, SI 74, PW 0·23, AL 0·46.

Mandibles slender and shallowly curved along their external borders, tapering gradually from base to apex. Apical fork of each mandible of 2 teeth, without intercalary teeth or denticles. Left mandibular blade with only 1 preapical tooth (the proximal), right mandible with 2 preapical teeth present. Upper scrobe margins gradually divergent, the eyes partially visible in full-face view. Eyes small, with only 4 ommatidia, their maximum diameter less than the maximum width of the scape. Preocular notch absent, the ventral surface of the head without a transverse preocular groove or impression. Antennal scapes shallowly curved in the basal third, only slightly broadened medially; the leading edges equipped with a row of apically curved spoon-shaped hairs which are slightly smaller than those fringing the upper scrobe margins.

Ground-pilosity of head reduced and sparse, consisting of inconspicuous small flattened hairs. Upper scrobe margins with a double or triple row of large spoon-shaped hairs which are curved anteriorly and are much more conspicuous than the ground-pilosity. Dorsum of head with 6 standing hairs arranged in a transverse row of 4 close to the occipital margin and a more anteriorly situated pair. Cephalic dorsum reticulate-punctate. Pronotal humeri each with a single straight stout hair which is clavate apically, without the elongate fine flagellate hair usually seen in this position. Mesonotum with a single pair of short broadly clavate standing hairs. Ground-pilosity of dorsal alitrunk consisting of small flattened hairs which are closely applied to the surface, similar to those found on the head. Metanotal groove a transverse line on the dorsum, weakly impressed in profile. Mesonotum in profile not sharply depressed behind the level of the pair of hairs, instead the dorsum of the mesonotum forming a more or less even slope to the metanotal groove. Propodeal teeth small and triangular, subtended by infradental lamellae. Sides of alitrunk smooth except for peripheral punctures round the pleurae and propodeum. Dorsum of pronotum with widely spaced longitudinal rugulae, the remainder of the dorsal alitrunk reticulate-punctate. Petiole node punctate, the postpetiole smooth. Spongiform appendages of pedicel segments small, the petiole with only a very narrow ventral strip and the ventral spongiform lobe of the postpetiole smaller than the exposed area of the postpetiolar disc in profile. Basigastral costulae short but sharply defined, arising across the width of the tergite rather than radiating from each side of a broad central clear area. Petiole, postpetiole and gaster dorsally with stout clavate standing hairs. Colour brownish yellow.

Paratype workers. TL 1·7–1·8, HL 0·45–0·46, HW 0·32–0·34, CI 70–74, ML 0·17–0·19, MI 37–41, SL 0·24–0·25, SI 73–75, PW 0·22–0·24, AL 0·42–0·46 (4 measured).

As holotype but some have the mesonotal dorsum shallowly concave in profile.

Holotype worker, **Cameroun**: Nkoemvon, 1979 (*D. Jackson*) (BMNH).

Paratypes. **Gabon**: 1 worker, Ile aux Singes, IS 1–4 (*J. A. Barra*) (MCZ). **Cameroun**: 1 worker, Fo Tabe, 19.i.1937 (no collector's name) (BMNH).

Non-paratypic material examined. **Cameroun**: nr Yaounde (*G. Terron*).

Of the four *arnoldi*-complex species in which only a single preapical tooth is present on the left mandible, *irrorata* is identified by its possession of only a single preapical tooth on the right mandible also, and *katapelta* by its possession of intercalary small teeth between the teeth of the apical mandibular fork. Of the two species remaining, which have 2 preapical teeth on the right mandible and lack intercalary teeth, *dextra* is recognized by having a long fine flagellate hair at each of the pronotal humeri, whilst *paranax* has a stout straight strongly clavate hair in this position.

Strumigenys petiolata Bernard **sp. rev.**

(Figs 58, 71)

Strumigenys petiolata Bernard, 1952: 254, figs 14 H–J. Syntype workers, Guinea: Mt Nimba, 700 m, in termitary in forest (*Villiers*) (not found in MNHN; presumed lost). [Previously synonymized with *rufobrunea* by Brown, 1954: 17.]

Worker. TL 2·0–2·5, HL 0·54–0·68, HW 0·40–0·53, CI 75–83, ML 0·24–0·32, MI 44–50, SL 0·28–0·36, SI 64–72, PW 0·25–0·32, AL 0·50–0·64 (38 measured).

Mandibles in full-face view with the outer margins shallowly convex, the blades feebly bowed outwards. Apical fork of each mandible consisting of a pair of spiniform teeth, without intercalary teeth or denticles. Preapical armament of each mandibular blade of 2 teeth, the proximal spiniform and the longest in each case. Right distal preapical tooth usually larger than the left. Upper scrobe margins shallowly sinuate in full-face view and bordered by a narrow rim or flange throughout their length. Eyes visible in full-face view, their maximum diameter equal to or greater than the maximum width of the scape. Preocular notch present and strongly developed, the anterior portion of the eye detached from the side of the head. Preocular notch continued onto ventral surface of head as a transverse groove which is narrower than the maximum diameter of the eye and which usually has quite sharply defined margins. Antennal scapes not or only extremely shallowly bent basally, broadest at about the midlength and their leading edges equipped with a row of apically curved narrowly spoon-shaped hairs which are slightly smaller than those on the upper scrobe margins. Cephalic ground-pilosity of minute inconspicuous spatulate to spoon-shaped hairs which are closely applied to the surface. Upper scrobe margins with a row of anteriorly curved large spoon-shaped hairs. Dorsum of head with 6 standing hairs which are arranged in a transverse posterior row of 4 close to the occipital margin and a more anteriorly situated pair. Head finely and usually very sharply

reticulate-punctate but in some samples the sculpture is less intensely developed, the punctures not so sharply incised. Pronotal humeri lacking flagellate or any other kind of outstanding hair. Mesonotum with a single pair of stout standing hairs. Ground-pilosity of alitrunk of minute hairs similar to those on the cephalic dorsum. Posterior half of mesonotum sharply depressed behind the level of the standing hairs. Metanotal groove represented by a line across the dorsum but not or only very feebly impressed. Propodeal teeth triangular and subtended by an infradental lamella on each side. Sides of alitrunk with the pleurae smooth except for peripheral punctulae which are best developed dorsolaterally. Sides of propodeum above and behind the spiracle punctulate. Sides of pronotum varying from smooth to very weakly striolate, sometimes also with vestigial punctures. Pronotal dorsum usually finely longitudinally striolate or costulate, often with fine superficial punctures between the longitudinal sculpture. Frequently the costulae or striae are poorly defined and the punctures more conspicuous, and in some samples dense punctures constitute the principal component. Dorsal alitrunk behind pronotum densely reticulate-punctate. Petiole node punctate dorsally, the postpetiole often with some fine longitudinal striolae but these are very variable in development and frequently are absent. Petiole with a narrow ventral spongiform strip whose depth is less than half the depth of the peduncle at its midlength. Sides of petiole node with a small triangular appendage. Ventral spongiform lobe of postpetiole usually marginally larger than the lateral lobe in profile. Petiole, postpetiole and gaster with standing hairs. Colour often uniform, varying in shade from yellow to dark brown or even blackish brown; sometimes with the gaster considerably darker in colour than the head and alitrunk.

One of the most successful and widely distributed *Strumigenys* of the Afrotropical region, *petiolata* nests in rotten wood, under the bark of more recently fallen timber, in log mould, or sometimes directly into the soil. The workers forage singly in the topsoil, leaf litter or in rot tunnels in wood.

As I have not been able to find the types of *petiolata* my interpretation of this name and its application to this common species must remain somewhat shadowed with doubt. The interpretation is based on Bernard's insufficient original description and figure and supplemented by the notes in Brown's (1954) revision, in which he treated *petiolata* as a synonym of *rufobrunea*. Since that time considerably more material has been amassed and it was noted that Brown's *rufobrunea* consisted of more than one species. In particular a number of West African samples with pronotal flagellate hairs, narrower heads and overall smaller size, were found to match the *rufobrunea* types perfectly, and the South African *faurei* type (also included as a synonym of *rufobrunea* by Brown) has also proved to be a separate species. This left the common species which lacked pronotal flagellate hairs, and which formed the bulk of Brown's concept of *rufobrunea*, with the possible available name of *petiolata*, now applied here. Admittedly Bernard's description could apply to any of the names mentioned above but his figure does not show pronotal flagellate hairs and neither are such hairs mentioned in the description. Because of this, and because the species is so common in West Africa, I have decided that the name *petiolata* is most probably applied to the following material, with the diagnostic characters described above.

MATERIAL EXAMINED

Ivory Coast: Man (*V. Mahnert & J.-L. Perret*); Tai Forest (*V. Mahnert & J.-L. Perret)*; Issoneu (*V. Mahnert & J.-L. Perret*); Sassandra (*I. Löbl*); Banco Forest (*I. Löbl*); Divo (*L. Brader*); Gagnoa (*L. Brader*). **Ghana**: Enchi (*D. Leston*); Legon (*D. Leston*); Tafo (*D. Leston*); Tafo (*B. Bolton*); Tafo (*C. A. Collingwood*); Mampong (*P. Room*); Mt Atewa (*B. Bolton*). **Nigeria**: Ibadan (*A. Russell-Smith*); Gambari (*B. Bolton*); Apoje (*B. Taylor*). **Cameroun**: Nkoemvon (*D. Jackson*); nr Yaounde (*G. Terron*); Batanga (*G. Schwab*). **Gabon**: Makokou (*I. Lieberburg*); Makokou (*W. H. Gotwald*); Plateau d'Ipassa (*J. A. Barra*); Ile aux Singes (*J. A. Barra*). **Central African Republic**: Haut Mbomu (*N. A. Weber*). **Angola**: Dundo (*L. de Carvalho*); R. Chicapa (*L. de Carvalho*). **Sudan**: Khor Aba (*N. A. Weber*).

Strumigenys pretoriae Arnold

(Fig. 53)

Strumigenys pretoriae Arnold, 1949: 267, fig. 8. Syntype workers, SOUTH AFRICA: Transvaal, Pretoria, 22.i.1946 (*E. K. Hartwig*) (SAM) [examined].
Strumigenys pretoriae Arnold; Brown, 1954: 15.

WORKER. TL 2·3–3·0, HL 0·59–0·70, HW 0·43–0·54, CI 71–77, ML 0·26–0·31, MI 40–44, SL 0·33–0·40, SI 69–77, PW 0·27–0·33, AL 0·58–0·70 (5 measured).

Mandibular blades broad and powerful, the outer margins shallowly convex. Apical fork of each mandible of 2 teeth, without intercalary teeth or denticles. Each mandibular blade with 2 preapical teeth, crowded close to the mandibular apex, the proximal teeth larger than the distal. Upper scrobe margins in full-face view constricted immediately behind the frontal lobes; behind the constriction diverging posteriorly in an almost straight line on each side which passes directly above the inner margin of the eye on each side so that the latter is clearly visible in full-face view. Eyes very large, larger than in any other Afrotropical *Strumigenys*, their maximum diameter 0·23–0·24×HW; in full-face view the maximum eye diameter more than twice the width of the scape at its broadest. Preocular notch present, the anteriormost portion of the eye detached from the side of the head. Preocular notch continued onto ventral surface of head as an extensive impressed area. Antennal scapes quite slender, very feebly bent in the basal third, the leading edges with a row of apically curved spoon-shaped hairs. Dorsum of head clothed with short broad spoon-shaped hairs which are curved anteriorly and appear scale-like in full-face view. Hairs bordering the upper scrobe margins the same as those on the cephalic dorsum but slightly larger. Vertex of head with 4 simple standing hairs arranged in a transverse row close to the occipital margin, without a pair situated anterior to this row. Dorsum of head densely reticulate-punctate. Pronotal humeri without flagellate or any other kind of projecting hairs. Mesonotum with a single pair of standing hairs. Ground-pilosity of dorsal alitrunk of small broadly spoon-shaped to scale-like hairs, like those on the head but not so dense. In profile the posterior portion of the mesonotum slightly depressed, the metanotal groove minutely impressed. Propodeal teeth lamellate, subtended by broad infradental lamellae which are confluent with the basal margins of the teeth for about half of their length. Central areas of pleurae smooth but peripherally with punctate sculpture. Sides of pronotum with faint striolate markings. Pronotal dorsum finely longitudinally rugulose, the remainder of the dorsal alitrunk finely reticulate-punctate. Petiole node superficially reticulate-punctate, the postpetiole smooth or with traces of faint longitudinal costulae or striolae. Spongiform appendages of pedicel segments strongly developed. In profile the petiole with a large ventral strip which is almost as deep as the peduncle at its midlength; the lateral lobe extensive. Ventral and lateral lobes of postpetiole large and spongiform, the former larger than the exposed area of the postpetiolar disc in profile. Sides of postpetiole surrounded by projecting spongiform material in dorsal view. Base of first gastral tergite with a lamellate transverse strip from the more lateral portions of which the dense and sharply defined basigastral costulae arise. Petiole, postpetiole and gaster with standing hairs which are more or less simple or slightly expanded apically. Colour dull yellow to light yellowish brown.

S. pretoriae is immediately separated from its Afrotropical congeners by its very large eyes; no other species even approaches the ocular development seen here. Its closest relatives are *shaula*, *dromoshaula* and *dyshaula* but in all of these the pronotal humeri are equipped with flagellate hairs and the cephalic dorsum lacks the dense scale-like ground-pilosity characteristic of *pretoriae*.

MATERIAL EXAMINED

Botswana: Maxwee (*A. Russell-Smith*). **South Africa**: Transvaal, Nelspruit (*M. Samways*); Pretoria (*E. K. Hartwig*).

Strumigenys relahyla sp. n

(Figs 57, 74)

HOLOTYPE WORKER. TL 2·0, HL 0·56, HW 0·41, CI 73, ML 0·24, MI 43, SL 0·28, SI 68, PW 0·26, AL 0·52.

Apical fork of mandibles with 2 spiniform teeth, without intercalary teeth or denticles. Preapical armament of 2 teeth on each blade, the proximal longest, the distal about as long as, or slightly longer than, the distance separating the bases of the preapical teeth. Outer margins of mandibles shallowly convex in full-face view and the occipital margin broadly concave. Upper scrobe margins with a very narrow bordering rim or flange, the eyes mostly visible in full-face view. Maximum diameter of eye about 0·15×HW, slightly greater than the maximum width of the scape. Preocular notch present, narrow but distinct, the anterior portion of the eye not detached from the side of the head and the preocular notch not extended onto the ventral surface of the head as a transverse groove or impression. Antennal scapes feebly bent basally, broadened in the middle third, the leading edge equipped with a row of narrow spoon-shaped hairs which are smaller than those fringing the upper scrobe margin. Cephalic ground-pilosity of inconspicuous small spatulate hairs, the upper scrobe margins with a projecting row of large anteriorly curved spoon-shaped hairs. Dorsum of head with 6 standing hairs arranged in a transverse row of 4 close to the occipital margin and a more anteriorly situated pair. Dorsum of head finely reticulate-punctate.

Pronotal humeri each with a single long fine flagellate hair. Mesonotum with a single pair of stout standing hairs. Ground-pilosity of dorsal alitrunk of fine spatulate hairs similar to those on the head. Posterior portion of mesonotum depressed behind the level of the pair of hairs, with a shallow transverse impression immediately behind the descending slope. Remainder of mesonotum and dorsum of propodeum convex. Metanotal groove forming a transverse line on the dorsum. Propodeal teeth lamellate, confluent for slightly more than half their length with the conspicuous infradental lamellae. Sides of alitrunk unsculptured except for some faint scratch-like costulae on the pronotum and some feeble peripheral punctulation on the pleurae and propodeum. Pronotal dorsum longitudinally finely costulate-rugulose, the remainder of the alitrunk punctate. Dorsum of petiole node shallowly punctate, the postpetiole smooth. Spongiform appendages of pedicel segments moderately developed, the petiole with a thin ventral strip and small lateral lobe. Ventral spongiform lobe of postpetiole larger than the lateral lobe and larger than the exposed area of the postpetiolar disc in profile. Basigastral costulae relatively sparse, without secondary costulae arising between those which have their origins on the basal gastral strip. Petiole, postpetiole and gaster dorsally with standing hairs. Colour yellowish brown, the gaster darker.

PARATYPE WORKERS. TL 1·9–2·0, HL 0·54–0·56, HW 0·40–0·41, CI 73–76, ML 0·23–0·24, MI 43–44, SL 0·26–0·28, SI 65–68, PW 0·25–0·27, AL 0·51–0·54 (4 measured). As holotype.

Holotype worker, **Angola**: Duque de Braganca Falls, 12.iii.1972, riverbank (*P. Hammond*) (BMNH). Paratypes. 4 workers with same data as holotype (BMNH; MCZ).

Non-paratypic material examined. **Cameroun**: nr Yaounde (*G. Terron*). **Zaire**: Ituri Forest, Beni-Irumu (*N. A. Weber*). **Angola**: Dundo (*L. de Carvalho*); R. Camudembele (*L. de Carvalho*); R. Mussungue (*L. de Carvalho*); Dundo (*A. Machado*).

Size range of non-paratypic material is HL 0·50–0·53, HW 0·36–0·41, CI 72–77, ML 0·22–0·24, MI 44–46, SL 0·25–0·27, SI 66–69 (10 measured). Resembling the holotype but with variable colour ranging from uniform pale brown, through medium brown with the gaster darker, to uniform dark brown. The size of the ventral spongiform lobe of the postpetiole shows some variation but is always at least as large as the exposed area of the disc in profile. The distal preapical teeth of the mandibular blades are usually as described above but in a few samples they are shorter than the distance separating the bases of the two preapical teeth. *S. relahyla* belongs to a small aggregation of species in which the preocular notch is present but small, and is not extended onto the ventral surface of the head as a groove or impression. Of the species thus defined *relahyla* is distinguished by a lack of specialized characters when compared to the others. In *totyla* the pronotal humeri lack flagellate hairs; in *xenohyla* the scape hairs are very large and spoon-shaped, like those on the upper scrobe margins; in *adrasora* the spongiform appendages of the petiole and postpetiole are much reduced; in *rukha* the spongiform appendages are strongly developed; and in *dyshaula* the head is more narrowly and deeply impressed at the occipital margin.

Strumigenys rogeri Emery

(Figs 51, 72)

Strumigenys rogeri Emery, 1890: 68, pl. 7, fig. 6. Holotype worker, ST THOMAS I. (West Indies) (MCSN) [examined].

Strumigenys incisa Godfrey, 1907: 102 [attributed to Forel]. Syntype workers, GREAT BRITAIN: Scotland, Edinburgh, hothouse in Royal Botanic Garden, 10.vi.1904 (*R. Godfrey*) (BMNH) [examined]. [Synonymy by Donisthorpe, 1915: 341.]

Strumigenys sulfurea Santschi, 1915: 261. Syntype workers, GABON: Samkita (*F. Faure*) (NMB) [examined]. [Synonymy by Brown, 1954: 20.]

Strumigenys rogeri Emery; Brown, 1954: 20.

WORKER. TL 2·3–2·8, HL 0·58–0·74, HW 0·42–0·52, CI 69–75, ML 0·31–0·40, MI 51–58, SL 0·36–0·46, SI 82–89, PW 0·27–0·32, AL 0·58–0·68 (40 measured).

Mandibular blades almost straight and at full closure nearly parallel, not obviously bowed outwards. Apical fork of each blade with 2 spiniform teeth, without intercalary teeth or denticles. Preapical armament of 2 teeth on each blade, set in the distal third of the blade's length; the proximal preapical teeth larger than the distals. Upper scrobe margins narrowly concave immediately behind the frontal lobes, with a pinched-in appearance in full-face view. Behind this the upper scrobe margins feebly divergent to the level of the eye and relatively close together, sometimes even shallowly concave directly above the eye, then

diverging strongly to the scrobal apices. Eyes plainly visible in full-face view, the preocular notch strongly developed and the anterior portion of the eye detached from the side of the head. Preocular notch continued onto the ventral surface of the head as a broad impression which runs transversely immediately in front of the level of the eye, but not reaching the ventral midline. Antennal scapes long and slender, approximately straight, the leading edges equipped with a row of narrowly spatulate hairs which are angled towards the apex. Dorsum of head with short narrowly spatulate ground-pilosity which is directed anteriorly, the upper scrobe margins with a row of larger anteriorly curved spoon-shaped hairs. With the head in profile the dorsum with 6 standing hairs which are arranged as a row of 4 transversely close to the occipital margin and a more anteriorly situated pair. Dorsum of head reticulate-punctate. Pronotal humeri each with a long fine flagellate hair and the mesonotum with a single pair of stout standing hairs. Otherwise the dorsal alitrunk without standing hairs, the ground-pilosity of sparse narrow hairs which are closely applied to the surface. With the alitrunk in profile the posterior portion of the mesonotum sharply depressed, the metanotal groove represented by a transverse line across the dorsum but not or only minutely impressed. Propodeal teeth triangular and subtended by narrow infradental lamellae. Sides of alitrunk sometimes completely smooth but usually the propodeum punctulate and the pronotum with faint traces of striolate or costulate sculpture anteriorly. Pronotal dorsum longitudinally striolate or costulate on a finely punctate surface, but in some the costulae may be very feeble and indistinct; the median costula is usually stronger and more sharply defined than any other and in many samples forms a weak median longitudinal carina at least on the anterior half of the pronotum. Remainder of dorsal alitrunk reticulate-punctate. Dorsum of petiole node weakly reticulate-punctate, the postpetiole generally smooth but sometimes with vague sculptural vestiges. Petiole in profile with a spongiform ventral strip and the node with a transverse collar posteriorly. In profile the postpetiole with large ventral and lateral spongiform lobes. In dorsal view the postpetiole with a posterior spongiform strip which abuts a similar but narrower strip on the base of the first tergite. Basigastral costulae sparse but sharply defined. Dorsal surfaces of petiole, postpetiole and gaster with stout standing hairs which are weakly swollen apically. Colour dull yellow to light medium brown.

Among the members of the *rogeri*-complex in which the preocular notch is strongly developed and extends onto the ventral surface of the head as a transverse groove or impression, *rogeri* is characterized by its simple dentition (without intercalary teeth in the apical fork and with a full complement of preapical teeth), relatively long straight mandibles, long antennal scapes, presence of pronotal flagellate hairs, and presence of characteristically shaped upper scrobe margins which lack a projecting laminar rim or flange.

S. rogeri is a well known and very efficient tramp species, probably of West African origin but very widely distributed in the tropics by human commerce. It has also been recorded from hothouses and other constantly heated buildings in the temperate zone. Brown (1954) gives observations on the biology of *rogeri* which were made by Wilson in Cuba. In West Africa the species usually nests in rotten wood on the ground or under the bark of larger fallen trunks or branches, but on occasion it will nest directly in the soil or in wood which has crumbled almost to powder. The Neotropical distribution of *rogeri* is summarized by Brown (1962*b*) and Kempf (1972), and the Pacific distribution by Wilson & Taylor (1967).

MATERIAL EXAMINED

Afrotropical material. **Ivory Coast**: Tai Forest (*V. Mahnert & J.-L. Perret*); Bingerville (*V. Mahnert & J.-L. Perret*); Languededou (*V. Mahnert & J.-L. Perret*); Issoneu (*V. Mahnert & J.-L. Perret*); Sassandra (*I. Löbl*); Man (*I. Löbl*); Sangouine (*I. Löbl*); Divo (*L. Brader*); Banco Forest (*W. L. Brown*); Nzi Noua (*W. L. & D. E. Brown*). **Ghana**: Tafo (*B. Bolton*); Tafo (*D. Leston*). **Nigeria**: Gambari (*B. Bolton*). **Cameroun**: Nkoemvon (*D. Jackson*); nr Yaounde (*G. Terron*). **Gabon**: Samkita (*F. Faure*); Plateau d'Ipassa (*J. A. Barra*); Makokou (*I. Lieberburg*). **Angola**: Gubela (*P. Hammond*); R. Chicapa (*L. de Carvalho*); Cossa (*L. de Carvalho*). **Burundi**: Bujumbura (*A. Dejean*).

Other regions. **Solomon Is**: Guadalcanal (*E. S. Brown*). **Hawaii** (*F. X. Williams*). **New Hebrides**: Santo (*L. Weatherill*); Port Vila (*L. Weatherill*). **Wallis Is**: Uvea (*G. Hunt*). **Fiji Is**: Viti Levu (*W. L. & D. E. Brown*). **Malaysia**: Sarawak, Gunong Mulu Nat. Pk. (*B. Bolton*). **Great Britain**: Scotland, Edinburgh (*R. Godfrey*). **West Indies**: St Thomas I.; Montserrat (*N. A. Weber*); Dominica (*N. A. Weber*). **Cuba**: Trinidad Mts (*W. M. Mann*); Soledad (*W. M. Mann*). **Puerto Rico**: Mayaquez (*M. R. Smith*); Como Springs (*W. M. Wheeler*); El Yunque (*E. O. Wilson*). **Jamaica**: St Ann Parish (*M. Fiske*); James Hill. **Trinidad**: Tumpuna Res. (*J. Noyes*); Pitch Lake (*N. A. Weber*). **Haiti**: Moea (*Russo*); Mts N. of Jacmel (*W. M. Mann*). **Panama**: Barro Colorado I. (*A. Newton*). **Guiana**: R. Mazaruni (*N. A. Weber*). **Equador**: Pichincha, St Domingo (*S. & J. Peck*). **Seychelles**: Cousin I. (*G. M. Bathe*).

Strumigenys rufobrunea Santschi

Strumigenys rufobrunea Santschi, 1914*b*: 373. Lectotype female (designated by Brown, 1954: 17), and paralectotype worker, GUINEA: Conakry (*F. Silvestri*) (NMB) [examined].
Strumigenys rufobrunea Santschi; Brown, 1954: 17.

WORKER. TL 1·8–2·0, HL 0·48–0·53, HW 0·36–0·40, CI 73–76, ML 0·22–0·25, MI 45–48, SL 0·25–0·29, SI 69–74, PW 0·23–0·25, AL 0·42–0·49 (12 measured).

Mandibles in full-face view with the outer margins shallowly convex, the blades slightly bowed outwards. Apex of each mandible with 2 spiniform fork teeth, without intercalary teeth or denticles. Preapical armament of each mandible of 2 teeth, the proximal spiniform and longer than the distal; in general the distal preapical tooth of the left mandible slightly shorter than that of the right. Distance separating the bases of the preapical teeth on the left mandible at least as great as the length of the distal preapical tooth and usually greater. Upper scrobe margins shallowly sinuate rather than straight, bordered by a narrow rim or flange throughout their length. Eyes of moderate size, not concealed by the upper scrobe margins and visible in full-face view, their maximum diameter greater than the maximum width of the scape. Preocular notch present and strongly developed, the anterior portion of the eye detached from the side of the head. Preocular notch extended onto the ventral surface of the head as a transverse impression in front of the eye. Antennal scapes very shallowly bent in the basal third, slightly expanded in the median third and broadest at about the midlength. Leading edges of scapes with a row of apically curved hairs which are spatulate to narrowly spoon-shaped and conspicuously smaller than the hairs bordering the upper scrobe margins. Ground-pilosity of cephalic dorsum of inconspicuous small spatulate hairs which are closely applied to the surface, the upper scrobe margins with a very obvious row of larger broadly spoon-shaped hairs which are curved anteriorly. Dorsum of head with 6 standing hairs arranged in a transverse row of 4 close to the occipital margin and a more anteriorly stituated pair. Dorsum of head reticulate-punctate. Pronotal humeri each with a single fine flagellate hair. Mesonotum with a single pair of standing hairs, the dorsal alitrunk otherwise with only sparse appressed minute pilosity similar to that which forms the cephalic ground-pilosity. Posterior portion of mesonotum depressed behind the level of the standing hairs. Metanotal groove present as a line across the dorsum which is not or only very feebly impressed. Propodeal teeth triangular and subtended by a moderately developed infradental lamella which is confluent with the tooth for about half its length. Sides of pronotum showing vestigial costulate or striolate sculpture, or traces of punctures which are almost effaced. Pleurae smooth except for some peripheral punctulation. Pronotal dorsum finely longitudinally costulate or rugulose, sometimes with feeble punctures between the costulae. Remainder of dorsal alitrunk densely reticulate-punctate. Dorsum of petiole node densely and quite strongly reticulate-punctate, the node itself slightly broader than long but not a narrow transverse rectangle. Postpetiole smooth or rarely with vestiges of longitudinal striolate sculpture laterally. Spongiform appendages of pedicel segments moderately developed, the ventral petiolar strip spongiform but usually confined to the posterior two-thirds of the length. Ventral spongiform lobe of postpetiole fractionally larger than the lateral lobe. Basigastral costulae sharply defined. Petiole, postpetiole and gaster dorsally with stout standing hairs which are swollen to feebly clavate apically. Colour usually with head and alitrunk medium brown, the gaster darker brown, but uniformly dark individuals also occur.

In Brown's (1954) study of the African *Strumigenys* he synonymized two names, *petiolata* and *faurei*, under *rufobrunea*. Since then a considerable amount of material has been amassed and it now appears that each of these names represents a separate species, not for the reasons put forward by their original authors but based upon characters which have only become apparent as the number of samples available for study has increased. The bulk of the material referred by Brown to *rufobrunea* belongs in fact to *petiolata*, quickly separable as it lacks flagellate hairs at the pronotal humeri. The remainder is split between the genuine West African *rufobrunea* and the South African *faurei*, known at present only from Natal, both of which possess humeral flagellate hairs. Characters separating these two are given under *faurei*.

MATERIAL EXAMINED

Guinea: Conakry (*F. Silvestri*). **Ivory Coast**: Lamto (*W. H. Gotwald*); Man (*V. Mahnert & J.-L. Perret*); Adiopodoume (*V. Mahnert & J.-L. Perret*). **Ghana**: Legon (*D. Leston*); Mampong (*P. Room*). **Togo**: Palimé, Kpime Forest (*Vit*). **Nigeria**: Gambari (*B. Taylor*).

Strumigenys rukha **sp. n.**

HOLOTYPE WORKER. TL 2·4, HL 0·60, HW 0·45, CI 75, ML 0·28, MI 47, SL 0·33, SI 73, PW 0·29, AL 0·58.

Mandibular blades with their outer margins shallowly convex, feebly bowed outwards in full-face view. Mandibular apices each with a fork of 2 teeth, without intercalary teeth or denticles. Each blade with preapical armament of 2 teeth, the proximal the longest. Distal preapical tooth of left mandible longer than the distance separating its base from that of the proximal preapical tooth. Upper scrobe margins evenly divergent posteriorly, the eyes visible in full-face view. Maximum diameter of eye about equal to or very slightly greater than the maximum width of the scape, the eye with 14–15 ommatidia. Preocular notch present but vestigial, represented only by an inconspicuous shallow indentation of the ventrolateral margin immediately in front of the eye; the preocular notch not continued onto the ventral surface of the head as a transverse groove or impression. Antennal scapes very shallowly curved in the basal third, the median third expanded to about twice the basal width. Leading edges of scapes equipped with an apically curved row of slender spatulate hairs which are smaller than the projecting hairs fringing the upper scrobe margins. Ground-pilosity of cephalic dorsum of inconspicuous short flattened to spatulate curved hairs, the upper scrobe margins fringed by an anteriorly curved row of much larger hairs which are spatulate to narrowly spoon-shaped. Dorsum of head with 6 standing hairs arranged in a transverse row of 4 close to the occipital margin and a more anteriorly situated pair. Cephalic dorsum reticulate-punctate. Pronotal humeri each with a fine flagellate hair. Mesonotum with a single pair of stout standing hairs. Ground-pilosity of dorsal alitrunk of sparse inconspicuous hairs similar to those on the head. Posterior portion of mesonotum depressed behind the level of the pair of hairs. Metanotal groove represented by a feebly marked line across the dorsum, not impressed. Propodeal teeth short and broadly triangular, subtended by a broad infradental lamella on each side which is confluent with the tooth for half or more of its length. Sides of alitrunk mostly smooth, the pronotal sides with vestigial superficial reticulate markings and the pleurae with faint peripheral punctures. Pronotal dorsum longitudinally finely costulate-rugulose, the remainder of the dorsal alitrunk punctate. Petiole node punctate dorsally, the postpetiole smooth and shining. Spongiform appendages of pedicel segments well developed, the petiole ventrally with a broad spongiform strip which follows a basal low broad translucent triangular lobe. Ventral spongiform lobe of postpetiole larger than the lateral lobe and larger than the exposed area of the postpetiolar disc in profile. Petiole node in dorsal view transversely rectangular, with a posterior transverse lamella. Postpetiole surrounded on all sides with spongiform material, the lateral and ventral lobes projecting beyond the outline of the disc and visible in dorsal view. First gastral tergite with a narrow basal strip from which the sharply defined basigastral costulae arise. Petiole, postpetiole and gaster dorsally with standing stout hairs. Colour yellow.

PARATYPE WORKERS. TL 2·3–2·4, HL 0·57–0·60, HW 0·44–0·46, CI 75–79, ML 0·27–0·28, MI 47–49, SL 0·30–0·33, SI 67–73, PW 0·28–0·30, AL 0·56–0·60 (10 measured).

As holotype but in some the mesonotum with a shallow transverse impression at the base of the descending portion of the sclerite. The translucent lobe at the base of the petiole ventrally is very variable in shape and size. In most workers it is a triangular to rounded lobe but in some is much reduced and rarely it may be absent. The preocular notch, weakly developed at best, may be undetectable.

Holotype worker, **Kenya**: Embu, Kirimiri Forest, W. of Runyenje, 1550 m, 3.x.1977 (V. Mahnert & J.-L. Perret) (MHN).

Paratypes. 42 workers and 2 females with same data as holotype (MHN; BMNH; MCZ; ENSA).

Non-paratypic material examined. **Kenya**: Embu, Kirimiri Forest (*V. Mahnert & J.-L. Perret*). **Uganda**: Ft. Portal (*N. A. Weber*).

S. rukha is most closely related to *adrasora, relahyla*, and *dyshaula*. It is easily separated from the first of these as in *adrasora* the spongiform appendages of the pedicel segments are small, the ventral postpetiolar lobe being smaller than the exposed portion of the postpetiolar disc in profile. In *rukha* the spongiform appendages are better developed than in *dyshaula* and *relahyla*, but in *dyshaula* the distal preapical tooth of the left mandible is much more slender than the proximal and only about half of its length, whereas in *rukha* the distal preapical tooth of the left mandible is only marginally narrower than the proximal and is three-quarters or more of its length. In *relahyla* the mandibles are slightly shorter (MI 43–46) and stouter than in *rukha* (MI 47–49) and the preocular notch is much more strongly impressed.

Strumigenys sarissa **sp. n.**

(Fig. 50)

HOLOTYPE WORKER. TL 2·9, HL 0·72, HW 0·52, CI 72, ML 0·38, MI 53, SL 0·46, SI 88, PW 0·33, AL 0·74.

Apical fork of each mandible of 2 spiniform teeth, the fork of the left mandible with an intercalary small

tooth between the upper and lower spiniform teeth; right apical fork without an intercalary tooth. Blade of left mandible with a single preapical tooth, the proximal; right mandibular blade with 2 preapical teeth, a spiniform proximal (which is equal in size to that on the left blade) and a much smaller distal preapical tooth which is situated very close to the apical fork and is hidden from view by the right dorsal fork tooth when the mandibles are closed. Upper scrobe margins irregular in full-face view, not fringed by a lamina throughout their length. Behind the convex frontal lobes the upper scrobe margins are sharply concave and have a pinched-in appearance. Posterior to this the upper scrobe margins expand and diverge, are shallowly concave above the eyes so that the latter are clearly visible, and diverge more strongly behind this. Preocular notch deep and strongly developed, the anterior portion of the eye detached from the side of the head. Preocular notch continued onto ventral surface of head as a shallow but broad impression. Antennal scapes elongate and narrow, subcylindrical and with all the hairs on the leading edges directed apically. Ground-pilosity of head everywhere of fairly dense narrowly spatulate hairs which are curved anteriorly, the hairs fringing the upper scrobe margins not noticeably larger than those elsewhere on the vertex. In profile the vertex lacking larger prominent hairs which project above the ground-pilosity. Entire cephalic dorsum finely punctate. Pronotal humeri each with a long fine flagellate hair and the curved anterior margin of the pronotum between the flagellate hairs with a pair of shorter but stouter erect simple curved hairs. Mesonotum with a pair of strong standing hairs, the dorsal alitrunk otherwise without standing pilosity except that in a few paratypes a second pair of simple erect hairs may occur on the pronotum. Ground-pilosity of dorsal alitrunk of sparse curved narrow hairs which are closely applied to the surface. In profile the pronotum and anterior mesonotum high and convex, the posterior mesonotum and propodeum depressed. Metanotal groove not impressed. Propodeum with a pair of triangular teeth which are subtended by narrow infradental lamellae. Sides of alitrunk feebly punctate peripherally, the main area of the pleurae smooth. Dorsal alitrunk punctate everywhere. Dorsum of petiole punctate, the postpetiole showing vestigial punctate sculpture. Petiole in profile without a ventral spongiform appendage, with a narrow posterior collar on the node. Postpetiole with a moderate ventral spongiform lobe and a smaller lateral lobe. In dorsal view the postpetiole with a narrow posterior spongiform strip. Base of first gastral tergite with a narrow transverse strip, with numerous fine basal costulae. Petiole, postpetiole and gaster dorsally with strong standing pilosity which is clavate apically. Colour light brown.

Paratype workers. TL 2·9–3·2, HL 0·72–0·82, HW 0·50–0·60, CI 68–75, ML 0·38–0·44, MI 53–55, SL 0·46–0·52, SI 83–92, PW 0·30–0·38, AL 0·74–0·80 (15 measured).

As holotype but some with a second pair of simple hairs on the pronotum which are sited beside the flagellate hairs. Postpetiolar sculpture may be intense so that the disc is as strongly punctate as the petiole, and the basigastral costulae may be more strongly defined. The petiole ventrally usually lacks a spongiform appendage but in some a very narrow strip may be present.

Holotype worker, **Burundi**: Bujumbura, no. 82, 1977 (*A. Dejean*) (BMNH).

Paratypes. **Burundi**: 1 worker with same data as holotype; 2 workers with same data but no. 86. **Rwanda**: 17 workers and 1 female, Kayove, 2100 m, 15.v.1973 (*P. Werner*); 4 workers with same data but 25.v.1973; 2 workers with same data but 23.iv.1973; 2 workers, Kamiranzovu, 1900 m, i.1976 (*P. Werner*) (BMNH; MHN; MCZ; ENSA).

Non-paratypic material examined. **Zaire**: Lwiro (*P. J. Curtis*).

In the Afrotropical region the characteristic apical and preapical dentition where an intercalary tooth is present in the left apical fork but not in the right, and the left blade has one preapical tooth but the right blade has two, is restricted to the two species *sarissa* and *londianesis*. Details for separating them are tabulated under the latter name.

Strumigenys scotti Forel

(Fig. 75).

Strumigenys scotti Forel, 1912: 159. Syntype workers, Seychelle Is: Silhouette, Mare aux Cochons, 1000 ft (305 m), 1905 (*H. Scott*) (BMNH; MHN) [examined].
Strumigenys scotti Forel; Brown, 1954: 23.

Worker. TL 2·4–2·6, HL 0·62–0·70, HW 0·42–0·46, CI 64–70, ML 0·30–0·33, MI 46–50, SL 0·39–0·42, SI 88–95, PW 0.26–0·29, AL 0·60–0·66 (8 measured).

Mandibles in full-face view with the outer margins shallowly and evenly convex, the width of the blade approximately constant from the level of the proximal preapical tooth to near the base where the mandibles are somewhat narrowed. Apical fork of each mandible of 2 stout teeth, without intercalary teeth or

denticles. Each mandible with 2 stout preapical teeth which are situated in the apical third of the length of the blade. The proximal preapical teeth slightly longer than the distal, the distals longer than the distance separating the bases of the preapical teeth. Upper scrobe margins evenly and shallowly convex, rounding cleanly into the sides of the occipital lobes without trace of an angle, the two together forming a single evenly curved surface in full-face view. Upper scrobe margins not bounded by a rim or flange, the eyes clearly visible in full-face view. Eyes large, with about 20 ommatidia, the maximum diameter of the eye distinctly greater than the maximum width of the scape. Preocular notch absent, the ventral surface of the head without a transverse preocular groove or impression. Antennal scapes long slender and subcylindrical, only very feebly curved near the base and with their leading edges equipped with a row of slender small hairs which curve towards the apex and which are slightly flattened or spoon-shaped apically. Cephalic dorsum densely clothed with curved narrow spatulate to spoon-shaped ground-pilosity, the upper scrobe margins fringed with a dense row of hairs which are the same shape and size as those on the dorsum. Cephalic dorsum with 6 simple standing hairs arranged in a transverse row of 4 close to the occipital margin and a more anteriorly situated pair. Pronotal humeri each with a single long fine flagellate hair. Mesonotum with a single pair of standing hairs. Ground-pilosity on alitrunk as on head but the hairs smaller and sparser. Posterior portion of mesonotum shallowly depressed behind the level of the standing hairs. Propodeal teeth triangular and subtended by narrow infradental lamellae. Sides of alitrunk superficially punctulate peripherally, the pleurae mostly smooth. Pronotal dorsum longitudinally feebly rugulose and punctate. Remainder of dorsal alitrunk reticulate-punctate. Petiole node in dorsal view reticulate-punctate and at least as long as broad, often longer than broad. Postpetiole smooth and shining. Spongiform appendages of pedicel segments well developed, the petiole with a ventral strip and conspicuous lateral lobe on the node. Postpetiole with large lateral and ventral spongiform lobes of which the ventral is the larger, about as large as the exposed area of the postpetiolar disc in profile. In dorsal view the spongiform material not or only very slightly projecting beyond the lateral outline of the disc. Basigastral costulae arising on each side of a central clear area. Dorsal surfaces of petiole, postpetiole and gaster with standing hairs which are simple or very slightly thickened apically. Colour yellowish brown to medium brown.

The affinities and differentiation of *scotti* are discussed under *hastyla*, a closely related species.

S. scotti is still only known from a couple of collections, one made in the Seychelles and the other on São Tomé island. This implies that *scotti* is most probably an Afrotropical species of limited tramping ability, but to date no samples have been found on the continental mainland.

MATERIAL EXAMINED

Seychelles: Silhouette I. (*H. Scott*). **São Tomé & Principe**: São Tomé I., Mkambrera (*B. Malkin*).

Strumigenys shaula sp. n.

HOLOTYPE WORKER. TL 2·2, HL 0·57, HW 0·44, CI 77, ML 0·25, MI 44, SL 0·29, SI 66, PW 0·28, AL 0·56.

Mandibles in full-face view weakly bowed outwards. Apical fork of each mandible with 2 teeth, without intercalary teeth or denticles. Preapical armament of 2 teeth on each mandibular blade, both situated close to the apex, the proximal longer than the distal in each case. Space separating the proximal and distal preapical teeth distinctly shorter than the length of the distal tooth. Upper scrobe margins bordered by a narrow rim or flange throughout their length, evenly divergent posteriorly and approximately straight rather than sinuate. Eyes relatively large, plainly visible in full-face view, the maximum diameter of the eye 0·18×HW, and in full-face view the length of the eye distinctly much greater than the maximum width of the scape. Preocular notch present and conspicuous, the anteriormost portion of the eye detached from the side of the head. Preocular notch continued onto ventral surface of head as a deep transverse groove which is narrower than the maximum diameter of the eye and has approximately parallel quite sharply defined margins. Antennal scapes feebly bent in the basal third and slightly thickened medially, the leading edges with a row of apically curved spoon-shaped hairs. Ground-pilosity of cephalic dorsum of inconspicuous small curved hairs, the upper scrobe margins fringed by a row of much larger spoon-shaped hairs which are curved anteriorly. Dorsum of head with 6 standing hairs arranged in a transverse row of 4 close to the occipital margin and a more anteriorly situated pair. Cephalic dorsum shallowly reticulate-punctate. Pronotal humeri each with a single fine flagellate hair, the mesonotum with a single pair of standing hairs. Ground-pilosity of dorsal alitrunk of minute hairs which are closely applied to the surface. With the alitrunk in profile the posterior portion of the mesonotum only very feebly depressed behind the level of the hairs, the metanotal groove weakly impressed. Propodeal teeth subtended by infradental lamellae which are about half as wide as the length of the tooth. Sides of propodeum superficially punctate, the pleurae mostly smooth except for some peripheral fine punctures which are best developed laterodorsally. Sides of pronotum with traces of punctate sculpture anteriorly and dorsally. Pronotal dorsum finely

longitudinally rugulose, the spaces between the rugulae inconspicously punctulate. Remainder of dorsal alitrunk reticulate-punctate. Dorsum of petiole node narrow from front to back and very broad, finely punctate; the postpetiole smooth. Spongiform appendages of pedicel segments moderately developed, the subpetiolar process narrower than the depth of the peduncle at its midlength. Ventral and lateral spongiform lobes of postpetiole well developed, the former only marginally larger than the latter and about equal in size to the exposed area of the postpetiolar disc in profile. In dorsal view the postpetiole with a narrow laminar posterior transverse strip; on the sides projecting spongiform material restricted to the posterior halves. Base of first gastral tergite with a laminar transverse strip from which the sharply defined basigastral costulae arise. Petiole, postpetiole and gaster dorsally with stout standing hairs which are thickened to feebly clavate apically. Colour yellowish brown to light brown.

PARATYPE WORKERS. TL 2·1–2·3, HL 0·54–0·58, HW 0·42–0·47, CI 75–81, ML 0·25–0·27, MI 44–47, SL 0·27–0·31, SI 64–69, PW 0·27–0·31, AL 0·52–0·58 (3 measured). As holotype.

Holotype worker, **Zimbabwe**: Gwebi, 1971, acc. 14746, pitfall trap (*K. J. Wilson*) (BMNH).
Paratypes. 3 workers with same data as holotype (BMNH; MCZ).

The closest relative of *shaula* appears to be *pretoriae*, but in that species the eyes are very large, the head has uniform scale-like pilosity and the pronotal humeri lack flagellate hairs. In the closely related *dromoshaula* from Burundi the extension of the preocular notch onto the ventral surface of the head forms a broad shallow dish-like impression with feebly defined rounded margins, rather than the narrow groove with sharp edges seen in *shaula*. In *dyshaula* the preocular notch is reduced, small and shallow in full-face view and not extended onto the ventral surface of the head. *S. shaula* also shows some relationship with the West African *rufobrunea* but the latter species is smaller, has longer scapes, smaller eyes, more sinuate upper scrobe margins and a petiole node which in dorsal view is only marginally broader than long, as well as the dental character given in the key

Strumigenys spathoda sp. n.

(Fig. 62)

HOLOTYPE WORKER. TL 2·1, HL 0·55, HW 0·44, CI 80, ML 0·16, MI 29, SL 0·27, SI 61, PW 0·27, AL 0·56.
Mandibles very short, stout and powerfully constructed, their outer margins convex. Apical fork of each mandible with 2 spiniform teeth, the upper of which is very long, its length distinctly greater than 0·5×ML; apical forks without intercalary teeth or denticles. Each mandible with 2 preapical teeth, the proximal by far the longest (just less than 0·5×ML) and situated at or just distal of the midlength of the blade. Distal preapical tooth less than half the length of the proximal. Upper scrobe margins bordered by a narrow rim or flange whose free margins are irregular, the eyes not visible in full-face view. Eyes very small, their maximum diameter conspicuously very much less than the maximum width of the scape. Preocular notch absent, the ventral surface of the head without a preocular transverse groove or impression on each side. Antennal scapes flattened and expanded, the leading edge broadly convex and prominent, equipped with a row of large spoon-shaped hairs which are about equal in size to those bordering the upper scrobe margins. Dorsum of head from the posterior clypeal margin to about the midlength densely clothed with broad anteriorly curved spoon-shaped hairs which appear scale-like in full-face view. Hairs of the same shape and size fringe the upper scrobe margins. Behind the midlength of the head the hairs are distinctly much smaller and narrow, and contrast strongly with those on the anterior half. Dorsum of head with a transverse row of 4 short stout standing hairs close to the occipital margin, without a more anteriorly situated pair. Cephalic dorsum reticulate-punctate to granular. Pronotal humeri each with a fine flagellate hair (apparently easily lost by abrasion in this species). Mesonotum with a single pair of standing hairs. Ground-pilosity of dorsal alitrunk consisting of sparse small hairs similar to those on the posterior half of the head. Metanotal groove represented by a short line on the dorsum, very feebly impressed in profile. Mesonotum not sharply depressed behind the level of the pair of hairs, instead its surface forming a fairly even slope. Propodeal teeth triangular and subtended by broad infradental lamellae. Sides of pronotum superficially sculptured, the pleurae and sides of propodeum mostly smooth, with some faint peripheral punctation. Pronotal dorsum sparsely longitudinally rugulose, the remainder of the dorsal alitrunk reticulate-punctate. Dorsum of petiole node punctate, the postpetiole smooth (when clean, in the holotype the surface is obscured by a thin layer of wax or dirt). Spongiform appendages of pedicel segments well developed. Petiole with a broad ventral strip which at its broadest is equal to the depth of the peduncle. Ventral and lateral spongiform lobes of postpetiole subequal, the former marginally larger and about the same size as the exposed area of

the postpetiolar disc in profile. Basigastral costulae short but quite sharply defined. Dorsal surfaces of petiole, postpetiole and gaster with stout standing hairs which are thickened to clavate apically. Colour medium brown.

PARATYPE WORKERS. TL 2·0–2·1, HL 0·53–0·55, HW 0·41–0·44, CI 77–81, ML 0·14–0·16, MI 26–30, SL 0·24–0·26, SI 55–61, PW 0·25–0·28, AL 0·48–0·56 (5 measured).

As holotype. All members of the type-series are covered to some extent by a thin layer of dirt or a waxy deposit which obscures some features. In particular the sculpture of the dorsal body is difficult to discern and the layer tends to obscure the pilosity.

Holotype worker, **Togo**: Palimé, Klouto Forest, 20–25.iv.1974 (*Vit*) (MHN).

Paratypes. 5 workers with same data as holotype (MHN; BMNH; MCZ).

Non-paratypic material examined. **Ivory Coast**: Man (*V. Mahnert & J.-L. Perret*). **Cameroun**: nr Yaounde (*G. Terron*).

This distinctive species has the shortest mandibles yet recorded for a member of *Strumigenys* in the Afrotropical region. It is related to *tetraphanes* but does not possess the massively lobate expansions of the anterior scape margins seen in that species and has pronotal flagellate hairs present.

Strumigenys stygia Santschi

Strumigenys stygia Santschi, 1913*a*: 257 (diagnosis in key). Syntype workers, KENYA: Cave A at Shimoni, st. no. 9, xi.1911 (*Alluaud & Jeannel*) (NMB) [examined].
Strumigenys stygia Santschi; Santschi, 1914*a*: 113, fig. 20 (description).
Strumigenys stygia Santschi; Brown, 1954: 29.

WORKER. TL 1·9–2·1, HL 0·50–0·53, HW 0·40–0·43, CI 80–84, ML 0·18–0·21, MI 36–40, SL 0·26–0·28, SI 63–68, PW 0·24–0·25, AL 0·48–0·52 (7 measured).

Apical fork of each mandible with 2 teeth, without intercalary teeth or denticles. Each mandibular blade with 2 preapical teeth, the proximal longer than the distal in each case. Upper scrobe margins convex, the eyes not visible in full-face view. Eyes small, the maximum diameter distinctly less than the maximum width of the scape. Preocular notch absent, ventral surface of head without a transverse preocular groove or impression. Antennal scapes curved in the basal third, the median third expanded and somewhat flattened, the convex leading edges of the scapes with a row of apically curved short broadly spoon-shaped hairs. Ground-pilosity of head relatively broad spoon-shaped hairs which are curved anteriorly and appear stud-like or scale-like in full-face view, the hairs on the dorsum anterior to the highest point of the vertex somewhat larger and more conspicuous than those posterior to this point. Hairs fringing the upper scrobe margins the same shape as those on the dorsum. Cephalic dorsum reticulate-punctate. Pronotal humeri each with a single fine flagellate hair. Mesonotum with a single pair of clavate standing hairs. Ground-pilosity of dorsal alitrunk of sparse spoon-shaped to scale-like small hairs. Mesonotum depressed behind the level of the pair of hairs. Metanotal groove represented on the dorsum by a faint line. Sides of pronotum superficially reticulate or granular, pleurae and propodeum laterally smooth except for some weak patches of punctate sculpture peripherally. Pronotal dorsum densely punctate, usually with overlying weak longitudinal rugulae. Remainder of dorsal alitrunk reticulate-punctate. Dorsum of petiole node reticulate-punctate, postpetiole superficially granular to reticulate-punctate. Ventral spongiform strip of petiole narrow and inconspicuous. Ventral spongiform lobe of postpetiole equal to or slightly less than the exposed area of the postpetiole. Basigastral costulae conspicuous. Dorsal surfaces of petiole, postpetiole and gaster with stout standing hairs which are thickened or clavate apically. Colour light brown to medium brown.

S. stygia belongs to the core-species of the *arnoldi*-complex, which also includes *arnoldi, traegaordhi, mesahyla* and *nimbrata*. These four are separated from *stygia* as *arnoldi* lacks pronotal flagellate hairs, *nimbrata* has funicular segments 2 and 3 vestigial, and both *mesahyla* and *traegaordhi* do not have the postpetiole sculptured.

MATERIAL EXAMINED

Kenya: Shimoni (*Alluaud & Jeannel*). **Zimbabwe**: Umtali, Melsetter (*R. Mussard*). **Cameroun**: nr Yaounde (*G. Terron*). **Angola**: Bruco (*P. Hammond*).

Strumigenys tetraphanes Brown

(Fig. 60)

Strumigenys tetraphanes Brown, 1954: 30. Holotype worker, UGANDA: 5 miles (8 km) N. of Kampala, Kawanda Exp. St., 15.ii.1949, soil sample under elephant grass (*G. Salt*) (MCZ) [examined].

WORKER. TL 2·0–2·2, HL 0·54–0·60, HW 0·51–0·57, CI 91–97, ML 0·19–0·22, MI 34–37, SL 0·28–0·30, SI 52–55, PW 0·30–0·32, AL 0·50–0·58 (4 measured).

Mandibular apices each with a fork of 2 spiniform teeth, without intercalary teeth or denticles, the upper tooth of the apical fork very long, more than 0·5×ML. Preapical armament of each blade of 2 teeth, the proximal long and strongly spiniform, 2–3 times longer than the small distal preapical tooth. Upper scrobe margins sharply divergent behind, the head broad behind the midlength and almost as broad as long. Eyes not visible in full-face view, small, conspicuously much smaller than the maximum width of the scape. Preocular notch absent, the ventral surface of the head without a transverse preocular groove or impression. Antennal scapes flattened and enormously expanded anteriorly into a large lobe which about equals the clypeus in area. Leading edges of scapes with a row of broad shallowly spoon-shaped hairs. Dorsum of head from posterior clypeal margin to about the midlength densely clothed with very broad shallowly spoon-shaped hairs which appear scale-like to suborbicular in full-face view; such hairs also fringe the upper scrobe margins. Behind the midlength the cephalic ground-pilosity is much smaller, about the same as on the clypeus; the difference in size between these hairs and the broad scale-like hairs is striking. Dorsum of head with a transverse row of 4 longer narrowly clavate hairs close to the occipital margin, without a pair situated close to the highest point of the vertex. Head densely reticulate-punctate. Pronotal humeri lacking flagellate or any other kind of projecting hair. Mesonotum with a single pair of strongly clavate hairs. Ground-pilosity of dorsal alitrunk of small flattened hairs which are almost appressed. With the alitrunk in profile the sides of the pronotum thickly and bluntly marginate. Anterior portion of mesonotum shallowly convex, the posterior portion depressed behind the level of the clavate hairs and shallowly transversely impressed. Propodeal teeth subtended by broad infradental lamellae. Sides of pronotum reticulate-punctate, the pleurae and sides of the propodeum mostly smooth, with punctures peripherally. Dorsal alitrunk, petiole and postpetiole reticulate-punctate. Spongiform appendages of pedicel segments well developed. In profile the petiole with a straight narrow ventral strip; ventral spongiform lobe of postpetiole equal to or slightly smaller than the exposed area of the postpetiolar disc in profile, equalling or slightly larger than the lateral lobe. Basigastral costulae sharply developed but short. Petiole, postpetiole and gaster dorsally with stout hairs which are swollen or clavate apically. Colour brown.

The enormously expanded antennal scapes make *tetraphanes* one of the most easily recognized Afrotropical *Strumigenys* and this character, coupled with the form of the mandibles, pilosity, head width and sculpture, should make confusion of *tetraphanes* with any other species impossible.

MATERIAL EXAMINED

Uganda: Kampala, Kawanda Exp. Sta. (*G. Salt*). **Cameroun**: Nkoemvon (*D. Jackson*); nr Yaounde (*G. Terron*). **Gabon**: Plateau d'Ipassa (*J. A. Barra*).

Strumigenys totyla sp. n.

(Fig. 56)

HOLOTYPE WORKER. TL 2·3, HL 0·64, HW 0·45, CI 70, ML 0·28, MI 44, SL 0·34, SI 76, PW 0·29, AL 0·58.

Apical fork of each mandible with 2 spiniform teeth, without intercalary teeth or denticles. Preapical armament of each mandible of 2 stout teeth, the distal tooth about 0·75 × the length of the proximal. Outer margins of mandibles shallowly convex in full-face view. Upper scrobe margins bordered by a conspicuous laminar rim or flange throughout their length, the eyes visible in full-face view. Maximum diameter of eye about 0·17×HW, the maximum diameter of the eye distinctly greater than the maximum width of the scape. Preocular notch present and distinct on the ventrolateral cephalic margin but the anterior portion of the eye not detached from the side of the head. Preocular notch ending at the ventrolateral margin, not extending across the ventral surface as a groove or impression. Antennal scapes slightly bent in the basal third, broadest at about the midlength and the leading edges equipped with a row of apically curved narrowly spoon-shaped hairs which are only slightly smaller than those fringing the upper scrobe margins. With the head in full-face view the sides behind the apices of the scrobe margins approximately straight and convergent posteriorly. Ground-pilosity of head consisting of inconspicuous small spatulate to narrowly

spoon-shaped hairs. Upper scrobe margins with a row of anteriorly curved large spoon-shaped hairs. Dorsum of head with an occipital transverse row of 4 stout standing hairs, without a pair situated anterior to this row (it is possible that an anterior pair should be present but has been lost by abrasion in the holotype). Head finely reticulate-punctate everywhere. Pronotal humeri without flagellate hairs. Mesonotum with a single pair of stout standing hairs. Metanotal groove represented by a transverse line on the dorsum. In profile the posterior portion of the mesonotum depressed behind the level of the standing hairs. Propodeal teeth small, almost completely merged with the infradental lamellae and only with their extreme apices projecting. Sides of pronotum finely superficially punctate, the pleurae mostly smooth but with peripheral punctures; sides of propodeum finely punctate. Pronotal dorsum punctate and with irregular rugulae formed by alignment of the punctures, postero-central portion with some longitudinal costulae. Remainder of dorsal alitrunk and dorsum of petiole node reticulate-punctate, the postpetiole with some scratch-like faint striae towards the sides of the disc but smooth medially. Spongiform appendages of pedicel segments moderately developed, the petiole with a narrow ventral strip. Ventral spongiform lobe of postpetiole slightly larger than the exposed area of the disc in profile. In dorsal view the postpetiole is bounded by narrow spongiform strips both in front and behind, but spongiform material does not freely project beyond the outline of the sides except posterolaterally. First gastral tergite with a lamellate basal strip, the basigastral costulae short and radiating from the basal strip on each side of a clear central area. Dorsal surfaces of petiole, postpetiole and gaster with standing stout hairs. Colour yellow.

Holotype worker, **Cameroun**: nr Yaounde, sample no. 1784 (*G. Terron*) (ENSA).

Known only from the holotype, *totyla* belongs to that section of the *faurei*-complex in which the preocular notch is present but does not extend ventrally as an impression across the ventral surface of the head. Among the six species falling into this category (*relahyla, dyshaula, xenohyla, totyla, adrasora, rukha*) the *totyla* holotype is easily recognized by its lack of pronotal flagellate hairs and presence of only 4 standing hairs on the cephalic dorsum. In all the others flagellate hairs are present on the pronotum and the cephalic dorsum has 6 standing hairs. Unfortunately the universality of these characters among the closest relatives of *totyla* makes me suspect that perhaps the hairs have been abraded away.

Strumigenys traegaordhi Santschi

Strumigenys traegaordhi Santschi, 1913*a*: 257 (diagnosis in key). Syntype workers, South Africa: Natal, Piertermaritzburg (*I. Trägårdh*) (NMB) [examined].
Strumigenys traegaordhi Santschi; Santschi, 1914*c*: 28, fig. 4 (description).
Strumigenys traegaordhi Santschi; Brown, 1954: 26.

Worker. TL 2·0–2·1, HL 0·54–0·55, HW 0·43, CI 78–80, ML 0·24, MI 44, SL 0·30, SI 70, PW 0·28, AL 0·59–0·60 (2 measured).

Apical fork of each mandible with 2 teeth, without intercalary teeth or denticles. Preapical armament of each blade of 2 teeth, the proximal distinctly longer than the distal and both teeth situated in the apical third of the length of the blade. Upper scrobe margins bordered by a narrow rim, the eyes not visible in full-face view. Eyes small, their maximum diameter distinctly less than the maximum width of the scape. Preocular notch absent, the ventral surface of the head without a preocular transverse groove or impression on each side. Antennal scapes shallowly curved in the basal third and slightly expanded in the median third, broadest at about the midlength. Leading edges of scapes shallowly convex and with a row of apically curved narrowly spoon-shaped hairs. Dorsum of head with ground-pilosity which becomes narrower and finer from front to back. Anteriorly, from the level of the posterior clypeal margin to about the level of the ends of the preocular laminae the hairs are spoon-shaped and quite broad, appearing almost scale-like in full-face view. Behind this level, and posteriorly over the highest point of the vertex to the occipital margin, the hairs are much narrower and less conspicuous, narrowly spatulate in shape. Hairs fringing the upper scrobe margins spoon-shaped and as large as those on the anterior portion of the cephalic dorsum. In profile the dorsum of the head with 6 standing hairs arranged in a row of 4 close to the occipital margin and a more anteriorly situated pair which are about at the highest point of the vertex. Dorsum of head reticulate-punctate. Pronotal humeri each with an elongate fine flagellate hair, the mesonotum with two pairs of standing hairs, the posterior pair of which is only half as long as the anterior pair. Ground-pilosity of dorsal alitrunk of sparse narrowly spatulate hairs similar to those on the head behind the highest point of the vertex. Metanotal groove present as a feeble line across the dorsum. Apical portions of propodeal teeth, which are free from the narrow infradental lamellae, very narrowly triangular and almost spiniform. Sides of alitrunk mostly smooth, the pleurae and sides of the propodeum with some peripheral punctures.

Dorsal alitrunk reticulate-punctate, the pronotum also with some weak longitudinal rugulae. Dorsum of petiole node reticulate-punctate, the postpetiole smooth or at most with a few feeble punctures posteriorly. Spongiform appendages of pedicel segments moderately developed. In profile the petiole with a narrow ventral strip and a small lateral lobe, the postpetiole with the ventral lobe slightly smaller than the exposed area of the postpetiolar disc in profile. Basigastral costulae short but quite strongly defined. Petiole, postpetiole and gaster with standing stout hairs which are swollen or feebly clavate apically. Colour brown.

The closest relative of *traegaordhi* is *mesahyla*, known from Zimbabwe. The two are superficially very similar but differ as follows.

traegaordhi	*mesahyla*
Dorsum of head with 6 standing hairs, the hairs slender.	Dorsum of head with 4 standing hairs, the hairs thick.
Hairs of cephalic ground-pilosity much narrower posteriorly than anteriorly.	Hairs of cephalic ground-pilosity the same everywhere on the head.
Mesonotum with 2 pairs of stout standing hairs.	Mesonotum with a single pair of stout standing hairs.
Reticulate-punctate sculpture predominant on pronotum.	Longitudinal rugular sculpture predominant on pronotum.
Ventral spongiform lobe slightly smaller than exposed area of disc in profile.	Ventral spongiform lobe much larger than exposed area of disc in profile.
Basigastral costulae arising across entire width of first tergite.	Basigastral costulae arising on each side of a clear central area on first tergite.

MATERIAL EXAMINED

South Africa: Pietermaritzburg (*I. Trägårdh*).

Strumigenys vazerka sp. n.

(Fig. 52)

HOLOTYPE WORKER. TL 2·2, HL 0·58, HW 0·38, CI 66, ML 0·34, MI 59, SL 0·32, SI 84, PW 0·26, AL 0·54. Mandibles in full-face view long, noticeably divergent from base to apex, and with the outer margins of the blades convex. Apical fork of each mandible with 2 spiniform teeth, without intercalary teeth or denticles. Preapical armament of each mandible of 2 teeth, a long spiniform proximal and a short distal. Upper scrobe margins not bounded by a projecting rim or flange, close together behind the frontal lobes and evenly divergent posteriorly; not concave or impressed above the eyes but still quite close together so that the eyes are clearly visible in full-face view. Preocular notch present, deep and conspicuous, the anterior portion of each eye detached from the side of the head. Preocular notch continued onto ventral surface of head as a broad groove or impression. Maximum diameter of eye greater than the maximum width of the scape. Antennal scapes relatively long, straight and slender, their leading edges with a row of narrowly spatulate hairs which are directed apically. Ground-pilosity of cephalic dorsum inconspicuous, of short narrowly spatulate hairs which are curved anteriorly. Upper scrobe margins bordered by a row of anteriorly curved spoon-shaped hairs which are distinctly much larger than the cephalic ground-pilosity. In profile the dorsum of the head with 6 approximately erect simple hairs which are arranged in a transverse row of 4 close to the occipital margin and a more anteriorly situated pair. Dorsum of head finely and shallowly reticulate-punctate. Pronotal humeri each with a fine flagellate hair. Mesonotum with a single pair of stout erect hairs which are broadened apically; dorsal alitrunk otherwise without standing pilosity; the ground-pilosity of minute sparse hairs which are closely applied to the surface. Posterior portion of mesonotum depressed and on the same level as the propodeum, the metanotal groove represented by a transverse line on the dorsum but not impressed. Propodeum armed with a pair of short triangular teeth which are subtended by a narrow infradental lamella on each side. Sides of alitrunk smooth, unsculptured except for some vestigial punctulation on the posterior propodeum. Pronotal dorsum feebly longitudinally costulate or striate, without punctate sculpture. Anterior portion of mesonotum with vestigial punctures, the depressed posterior portion more strongly punctate. Propodeal dorsum mostly smooth, with a very few vestigial punctures laterally. Petiole node punctate-granular dorsally, the postpetiole with some sparse vestigial longitudinal costulae, most conspicuous towards the sides of the disc. In profile the petiole with a narrow ventral spongiform strip. Lateral and ventral spongiform lobes of postpetiole moderately developed. In dorsal view the postpetiole with a transverse narrow spongiform strip posteriorly and the first gastral tergite with a similar but even narrower strip anteriorly. Basigastral costulae sharply defined.

Petiole, postpetiole and gaster with stout standing hairs which are weakly clavate apically. Colour dull yellowish brown.

PARATYPE WORKERS. TL 1·9–2·2, HL 0·52–0·60, HW 0·36–0·40, CI 65–70, ML 0·28–0·34, MI 50–59, SL 0·29–0·34, SI 79–86, PW 0·22–0·28, AL 0·46–0·54 (15 measured).

As holotype but sculpture of alitrunk showing some variation. Sides usually smooth but in some peripheral faint punctulae are present. Dorsum of pronotum usually as holotype but in some the costulae are more pronounced and quite strong, and in others there is a faint punctulate component visible between the costulae. Anterior portion of mesonotum sometimes as distinctly punctate as the depressed posterior portion. Propodeal dorsum usually smooth but often with fine faint lateral or peripheral punctulae, but never punctulate all over the surface.

Holotype worker, **Ivory Coast**: Man, Mt Tonkoui, 900 m, 13.x.1980 (*V. Mahnert & J.-L. Perret*) (MHN).

Paratypes. **Ivory Coast**: 11 workers with same data as holotype; 22 workers and 2 females, Tai Forest, 17.x.1980 (*V. Mahnert & J.-L. Perret*) (MHN; BMNH; MCZ; ENSA).

Non-paratypic material examined. **Ivory Coast**: Divo (*L. Brader*); Abidjan, Banco Forest (*W. L. Brown*); Banco Nat. Pk. (*V. Mahnert & J.-L. Perret*); Sassandra (*V. Mahnert & J.-L. Perret*). **Ghana**: Mt Atewa (*D. Leston*). **Nigeria**: Gambari (*B. Bolton*).

The closest relative of *vazerka* is the Central African *bernardi*, but in the latter the left mandibular blade has lost the distal preapical tooth and the propodeal dorsum is reticulate-punctate.

Strumigenys xenohyla sp. n.

(Figs 54, 73)

HOLOTYPE WORKER. TL 2·3, HL 0·60, HW 0·47, CI 78, ML 0·29, MI 48, SL 0·33, SI 70, PW 0·27, AL 0·58.

Apical fork of each mandible with a pair of spiniform teeth, without intercalary teeth or denticles. Preapical armament on each mandibular blade of 2 teeth, both spiniform but the proximal much the longest. Length of the distal preapical tooth more than twice that of the distance separating the bases of the 2 preapical teeth. Upper scrobe margins bordered by a relatively broad conspicuous projecting lamina which has an irregular free margin and which partially conceals the eyes in full-face view. Eyes of moderate size, about 0·15×HW but only fractionally larger than the maximum width of the scape because of the broadening of the latter. Preocular notch present but shallow, the anterior portion of the eye not detached from the side of the head and the notch not extending onto the ventral surface of the head as a transverse groove or impression. Antennal scapes shallowly curved basally, broadened in the middle and slightly dorsoventrally flattened. Leading edges of scapes convex and weakly undulate, the undulate rim forming a narrow flange from which the large spoon-shaped hairs arise; these hairs are about equal in size to those on the upper scrobe margins. Ground-pilosity of cephalic dorsum inconspicuous, of narrow spoon-shaped hairs. Upper scrobe margins with an anteriorly curved row of large spoon-shaped hairs. Cephalic dorsum with 6 standing hairs arranged in a transverse row of 4 close to the occipital margin and an anterior pair close to the highest point of the vertex. Dorsum of head reticulate-punctate. Pronotal humeri each with a long fine flagellate hair. Mesonotum with a single pair of stout standing hairs which are broadly clavate apically. Ground-pilosity of dorsal alitrunk of sparse spatulate to narrowly spoon-shaped hairs which are closely applied to the surface. Mesonotum suddenly and steeply depressed behind the level of the hairs. Metanotal groove represented by a line across the dorsum. Propodeal teeth lamellate and confluent with the broad infradental lamellae for more than half their length. Sides of pronotum with a few faint scratch-like marks. Pleurae and sides of propodeum smooth. Pronotal dorsum finely longitudinally costulate, without punctures. Remainder of dorsal alitrunk almost smooth, with only the vaguest traces of punctulate sculpture present. Dorsum of petiole node granular, the postpetiole smooth. Spongiform appendages of pedicel segments well developed, the petiole with a ventral spongiform strip which is more than half the depth of the peduncle, and with a broadly triangular lateral lobe. Ventral spongiform appendage of postpetiole large, larger than the lateral lobe and distinctly much larger than the exposed area of the postpetiolar disc in profile. In dorsal view the petiole node with a lamellate collar posteriorly. Sides of postpetiole with projecting spongiform tissue visible. Base of first gastral tergite with a lamellar transverse strip from which the sparse basigastral costulae radiate on each side of a central smooth area. Petiole, postpetiole and gaster dorsally with stout standing hairs which are thickened apically. Colour dull yellow.

PARATYPE WORKER. TL 2·3, HL 0·61, HW 0·48, CI 79, ML 0·30, MI 49, SL 0·34, SI 71, PW 0·27, AL 0·58. As holotype.

Holotype worker, **Cameroun**: Nkoemvon, N22, 7.ix.1980 (*D. Jackson*) (BMNH).
Paratype. 1 worker with same data as holotype (BMNH).
Non-paratypic material examined. **Cameroun**: nr Yaounde (*G. Terron*). **Zaire**: Ituri Forest, vic. Epulu (*T. Gregg*).

Measurements of the two non-paratypic specimens show HL 0·64–0·67, HW 0·53, CI 79–83, ML 0·32–0·33, MI 48–51, SL 0·36, SI 68.

Among the species in which the preocular notch is present but not extended as a groove or impression across the ventral surface of the head, *xenohyla* is recognized by its broad flange or rim bordering the upper scrobe margins, flattened scapes, large spoon-shaped hairs on the scapes and upper scrobe margins which are about equal in size, reduced sculpture on the dorsal alitrunk and well-developed spongiform appendages.

Strumigenys zandala sp. n.

(Fig. 66)

HOLOTYPE WORKER. TL 2·3, HL 0·60, HW 0·42, CI 70, ML 0·27, MI 45, SL 0·34, SI 81, PW 0·27, AL 0·60.

Mandibles slender in full-face view, the external margins very shallowly evenly convex and the blades about the same width from the proximal preapical tooth to the base where they are somewhat narrowed and inflected. Apical fork of each blade with 2 teeth, without intercalary teeth or denticles. Each mandibular blade with 2 preapical teeth, the proximal longer and slightly stouter than the distal, both teeth distinctly within the apical third of the length of the blade. Distance separating the bases of the preapical teeth less than the length of the distal tooth. Upper scrobe margins evenly and shallowly convex in full-face view, the eyes visible, the apices of the upper scrobe margins confluent with the sides of the occipital lobes through an even curve, without an angle separating the two. Eyes moderate, with 19–20 ommatidia, the maximum diameter greater than the maximum width of the scape. Preocular notch absent, the ventral surface of the head without a transverse preocular groove or impression. Antennal scapes slender and subcylindrical, curved weakly near the base and with their leading edges equipped with a row of slender flattened hairs which are narrowly spatulate to spoon-shaped and curved towards the apex. Dorsum of head densely clothed with curved narrowly spatulate to slender spoon-shaped ground-pilosity, the upper scrobe margins fringed by a dense row of similar hairs, these hairs slightly larger than those on the scapes. Dorsum of head with 6 standing hairs arranged in a row of 4 close to the occipital margin and a more anteriorly situated pair. Dorsum of head densely reticulate-punctate. Pronotal humeri each with a single fine flagellate hair. Mesonotum with a single pair of simple standing hairs. Ground-pilosity of dorsal alitrunk of narrow curved flattened hairs. Posterior portion of mesonotum shallowly depressed behind the level of the hairs. Metanotal groove feebly impressed. Propodeal teeth triangular and subtended by narrow infradental lamellae. Sides of pronotum superficially punctulate and with some feeble rugulae anteriorly. Upper third to half of mesopleuron, upper third of metapleuron and portion of propodeum above and behind the spiracle densely punctate; lower portions of these segments smooth. Pronotal dorsum very feebly longitudinally rugulose and with punctate sculpture, remainder of dorsal alitrunk and petiole node reticulate-punctate. Postpetiole smooth. Spongiform appendages of pedicel segments well developed, the petiole with a broad ventral strip. Postpetiole with large lateral and ventral lobes, the latter larger than the former and larger than the exposed area of the disc in profile. In dorsal view the petiole node broader than long and the postpetiole surrounded by spongiform tissue, the lateral lobes projecting sideways beyond the outline of the disc. Basigastral costulae fine, arising on each side of a central clear area. Dorsal surfaces of petiole, postpetiole and gaster with simple standing hairs. Colour light brownish yellow.

PARATYPE WORKERS. TL 2·2–2·3, HL 0·59–0·61, HW 0·42–0·44, CI 70–73, ML 0·26–0·27, MI 43–45, SL 0·33–0·35, SI 75–81, PW 0·24–0·30, AL 0·57–0·63 (10 measured). As holotype.

Holotype worker, **Equatorial Guinea**: Annobon I., 400–500 m, v.1902 (*L. Fea*) (MCSN).
Paratypes. 27 workers with same data as holotype (MCSN; BMNH; MCZ).
Non-paratypic material examined. **Cameroun**: nr Yaounde (*G. Terron*).

S. zandala is closely related to *scotti* and *hastyla*. It is separated from the first of these by its shorter mandibles and scapes and by the shape of the petiole node in dorsal view which is broader than long in *zandala* and at least as long as broad (sometimes longer than broad) in

scotti. *S. hastyla* is a smaller species than *zandala* and has the standing hairs on the gaster distinctly swollen or flattened apically in dorsal view. There is a possibility that *hastyla* and *zandala* may represent extremes of a single species but for the present I am treating them as separate species.

QUADRISTRUMA Brown

(Fig. 67)

Quadristruma Brown, 1949*b*: 47. Type-species: *Epitritus emmae* Emery, 1890: 70, pl. 8, fig. 6, by original designation.

Diagnosis of worker. Afrotropical dacetine ants. Mandibles linear and curved, relatively short (MI 26–32), produced into narrow blades and equipped apically with a strong fork of two long spiniform teeth in a vertical series, the dorsal tooth the longest. Inner margin of each mandibular blade with a long spiniform proximal preapical tooth and a small distal preapical denticle. Antennae with 4 segments. Scape with the leading edge angled but without a subbasal lobe. Head with scale-like to orbicular hairs present. Labral lobes very short and inconspicuous.

This small genus was erected to hold the species *emmae* and *eurycera* (Emery), both of which were originally described in the genus *Epitritus* because of their 4-merous antennae. Brown (1949*b*) showed that these two species, although seemingly similar to *Epitritus*, were in reality convergently so and had been derived from *Strumigenys* rather than from a *Smithistruma*-like ancestor as is the case with *Epitritus*. With the description of so many new *Strumigenys* and *Epitritus* since 1949 this discovery has been amply confirmed and in fact the differences between *Strumigenys* and *Quadristruma* have been narrowed down to the antennomere count, with 6 segments in the former and 4 in the latter genus. As seen in other dacetine genera (*Epitritus, Smithistruma*) this difference is insignificant at genus-level and it is likely that *Quadristruma* will eventually fall into the synonymy of *Strumigenys*.

Of the two species in *Quadristruma* one, *eurycera*, is known only from New Guinea, but the second species, *emmae*, is very widespread in the tropics by dint of being a successful tramp-species. Initially Brown (1949*b*) thought that the original range of *emmae* lay in the Indomalayan-Papuan area but later he revised this opinion (Brown, 1954) in favour of the Afrotropical region as the place of origin, as a derivation from the *Strumigenys rogeri*-group (in the sense of the 1954 paper, the *arnoldi*-complex of the present study) seemed certain. At that time *emmae* had not been found in sub-Saharan Africa but it was known from Hawaii, Guam, the U.S.A. (Florida), Puerto Rico, the West Indies, Cuba, Surinam, Sumatra, Singapore, and New Guinea (listed by Brown, 1949*b*). Wilson & Taylor (1967) added the Philippines, New Hebrides and Australia (Queensland) to the list, and Kempf (1972) the Bahamas. Soon after this the species was detected for the first time in West Africa, being recorded from Ghana (Bolton, 1973). The present paper adds localities in India, Malaysia, Sulawesi and Equatorial Guinea to the list, showing that *emmae* is indeed a very accomplished tramp-species and likely to be found in any tropical area of the world.

Quadristruma emmae (Emery)

(Fig. 67)

Epitritus emmae Emery, 1890: 70, pl. 8, fig. 6. Holotype worker, St Thomas I. (West Indies) (MCSN) [examined].

Epitritus clypeatus Szabo, 1909: 1, figs 1a, c. Syntype workers, New Guinea: Berlinhafen (*L. Biro*); and Singapore (*L. Biro*) (TM). [Synonymy by Brown, 1949*b*: 48.]

Epitritus clypeatus var. *malesiana* Forel, 1913*a*: 83. Syntype workers and female, Indonesia: Sumatra (*Buttel-Reepen*) (MHN). [Synonymy by Brown, 1949*b*: 48.]

Epitritus wheeleri Donisthorpe, 1916: 121. Holotype worker, Hawaii: Oahu, Honolulu (*R. C. L. Perkins*) (not in BMNH; presumed lost). [Synonymy by Brown, 1949*b*: 48.]

Quadristruma emmae (Emery) Brown, 1949*b*: 48.

WORKER. TL 1·7–1·9, HL 0·43–0·46, HW 0·35–0·39, CI 80–85, ML 0·12–0·14, MI 26–32, SL 0·18–0·22, SI 52–58, PW 0·21–0·25, AL 0·42–0·48 (15 measured).

Mandibles a pair of narrow linear outcurved blades, armed apically with a fork of 2 spiniform teeth of which the upper is the longer. Between the fork teeth the left mandible has 2, and the right mandible 1 or 2, minute intercalary denticles which cannot be seen when the mandibles are closed. Preapical armament consisting on both blades of a single long spiniform tooth at about the apical third of the length and usually also a minute denticle on the margin between the spiniform preapical tooth and the upper tooth of the apical fork, though in some samples this denticle is extremely small and inconspicuous. Anterior clypeal margin broad, projecting well beyond the mandibular bases on each side, with a feeble median impression and with numerous small spatulate to spoon-shaped hairs which are curved towards the midline. Lateral margins of clypeus short and with 2–3 anteriorly curved small spoon-shaped hairs. Preocular laminae broad, running back from the clypeus and anteriorly forming a strong floor below the antennal insertions. Median portion of clypeus broad, finely punctulate and with scale-like to suborbicular hairs present. Dorsum of head behind clypeus reticulate-punctate and with numerous broadly scale-like to orbicular hairs. Outer margins of frontal lobes and divergent upper scrobe margins behind them with a continuous row of scale-like to orbicular hairs, the row terminating at the posterior end of the scrobe in a more or less straight clavate hair on each side. Eyes very small, situated just above the ventral scrobe margin. Antennae with 4 segments, the scapes narrow basally but broadening to the midlength then narrowing again to the apex, the leading edge angular and prominent at about the midlength, with a row of projecting scale-like to spoon-shaped hairs. Pronotum more or less flat dorsally, anteriorly rounding into the sides, posteriorly meeting the sides in a broad blunt angle. In profile the mesonotal dorsum very shallowly convex anteriorly, very shallowly concave posteriorly before meeting the propodeum. Metanotal groove absent. Propodeal dorsum shallowly convex anteriorly, sloping posteriorly to the declivity. Propodeal teeth mostly incorporated in the infradental lamellae, with only a small point projecting. Sides of alitrunk smooth to superficially reticulate. Dorsal alitrunk and at least the upper half of the propodeal declivity reticulate-punctate, the punctures more strongly defined and denser on the pronotum than on the propodeum, where they may be superficial. Pronotal humeri each with a straight clavate hair and mesonotum with a similar but shorter pair of hairs. Ground-pilosity of dorsal alitrunk consisting of numerous small scale-like to broadly spoon-shaped hairs, most of which are closely applied to the surface. In profile the pedicel segments with moderately developed spongiform appendages. The ventral petiolar strip broad and distinct but the lateral lobe of the petiole node small. Lateral and ventral lobes of the postpetiole moderate and a spongiform pad present at the base of the first gastral sternite. Dorsal surface of petiole node finely punctate to reticulate, the postpetiole superficially reticulate to smooth. Posterior spongiform strip of petiole node very narrow, narrower than the strip bordering the anterior margin of the postpetiole. Sides of postpetiole in dorsal view surrounded by spongiform tissue and posteriorly with a narrow bordering strip. Base of first gastral tergite lamellar centrally, spongiform towards the sides, with a continuous row of basal costulae. Petiole, postpetiole and gaster with short straight narrowly clavate hairs. Colour dull yellow to pale brown.

MATERIAL EXAMINED

Ghana: Bunso (*P. Room*). **Equatorial Guinea**: Annobon I., Dint. del Pueblo (*L. Fea*). **Seychelles**: Aldabra I., Grande Terre (*V. Spaul*); Pt Hodoul (*V. Spaul*); Picard (*V. Spaul*); Big Sister I. (*U. Müller*). **India**: no loc. (*P. C. W. Westall*). **West Malaysia**: Sg Patani (*G. H. Lowe*). **Indonesia**: Sulawesi Tengah, Morowali (*M. J. D. Brendall*).

MICRODACETON Santschi

(Figs 78–81)

Microdaceton Santschi, 1913*b*: 478. Type-species: *Microdaceton exornatum* Santschi, 1913*b*: 478, by monotypy.

DIAGNOSIS OF WORKER. Afrotropical dacetine ants. Mandibles extended into elongate linear blades (MI 55–69) which terminate in an apical fork of 3 spiniform teeth arranged in a vertical series. Mandibular blades without preapical teeth or denticles. Palp formula 3,2 (as opposed to 1,1 in other African dacetines). Antennal scrobes absent; antennae with 6 segments. Petiole node armed with a pair of teeth or short spines dorsally. Postpetiole lacking spongiform appendages but with lateral alar extensions. Specialized body pilosity absent. Eyes dorsolateral.

Microdaceton, the only Afrotropical member of its genus-group, is closely related to the primarily Australian genera *Colobostruma, Mesostruma* and *Epopostruma* (Brown, 1952*b*; 1953*a*; Brown & Wilson, 1959; Taylor, 1973). Within the Dacetini this group of genera, the

subtribe Epopostrumiti, is defined by having the eyes placed dorsolaterally, above the scrobes when such are present; the antennae 4- or 6-segmented (the second funicular segment not longer than the rest); the palp formula 3,2 or 5,3; the postpetiole usually with lateral alar extensions. Both known species of *Microdaceton* are restricted to the Afrotropical region, *tibialis* being found in West and central Africa, and *exornatum* being widely distributed in East and South Africa.

List of Afrotropical *Microdaceton*

exornatum Santschi
  leakeyi Patrizi **syn. n.**
  exornatum var. *laevior* Arnold **syn. n.**
tibialis Weber

Key to species (workers)

1 Postpetiole in dorsal view very broad, spanning almost the entire basal width of the first gastral tergite (Fig. 80). The width of the postpetiole 0·60–0·65 times the maximum width of the first gastral tergite. Basigastral costulae usually distinct, rarely faint. Body colour yellow. (Kenya, Zambia, Zimbabwe, South Africa) .... ***exornatum*** (p. 402)

– Postpetiole in dorsal view narrow, spanning 0·70 or less of the basal width of the first gastral tergite (Fig. 81). The width of the postpetiole 0·46–0·56 times the maximum width of the first gastral tergite. Basigastral costulae absent. Body colour blackish brown to black. (Ivory Coast, Ghana, Zaire) .... ***tibialis*** (p. 403)

Microdaceton exornatum Santschi

(Figs 78, 80)

Microdaceton exornatum Santschi, 1913*b*: 478. Holotype worker, SOUTH AFRICA: Natal Zululand (*I. Trägårdh*) (not in NMB; presumed lost).

Microdaceton leakeyi Patrizi, 1947: 219, figs 1, 2. Holotype female, KENYA: Masai Reserve, Olorgasalic, iv.1945 (*S. Patrizi*) (IE) [not examined]. **Syn.n.**

Microdaceton exornatum var. *laevior* Arnold, 1948: 225. Syntype workers and female, SOUTH AFRICA: Natal, Zululand, Dukuduku; and Natal, Richard's Bay, February (*J. C. Faure*) (SAM) [examined]. **Syn. n.**

WORKER. TL 3·0–4·0, HL 0·79–1·00, HW 0·76–0·94, CI 92–96, ML 0·48–0·58, MI 55–61, SL 0·50–0·64, SI 66–70, PW 0·40–0·50, AL 0·70–0·90 (10 measured).

Mandibles elongate and linear, without preapical armament but armed apically with a fork of 3 long spiniform teeth set in a more or less vertical series, the apical fork teeth without intercalary denticles. Anterior clypeal margin with a small median notch or indentation. Eyes large and conspicuous, clearly visible in full-face view. Antennal scrobes absent, frontal carinae absent, the antennal fossa ventrally on each side with a small laterally projecting tubercle in front of the eye. Outline shape of head as in Fig. 79. Occipital lobes with 2 pairs of tubercles which are variable in size, the first pair laterodorsal, the second pair at the posteriormost point of the lobes. Clypeus coarsely punctate to narrowly foveolate, with appressed to slightly elevated fine simple ground-pilosity, without standing or specialized hairs of any description. Dorsum of head foveolate, with a fine short simple hair arising from the centre of each foveola, the hairs appressed or nearly so, the head without specialized or standing pilosity. In profile the dorsal surface of the head rising and shallowly convex from the posterior clypeal margin to about the midlength, then suddenly depressed. Sides of head foveolate as dorsum. Dorsal outline of alitrunk dominated by the strong subconical mesonotal teeth or tubercles and the long propodeal spines (Fig. 78), the latter without or only with a vestige of an infradental lamella. Metapleural lobes long and broad, slightly upcurved. Sides of alitrunk foveolate but on the mesopleuron the sculpture may be partially or almost wholly effaced. Dorsal surfaces of pronotum and mesonotum strongly foveolate, the metanotal groove with short longitudinal cross-ribs. Propodeal dorsum reticulate-punctate, sometimes with one or two laterally situated partial foveolae. Alitrunk without specialized or bizarre pilosity, only with fine short simple hairs arising from the foveolar centres. Usually these hairs are very short inconspicuous and appressed, but in some they may be longer and slightly elevated. Petiole in profile without spongiform or alar appendages, armed dorsally with a pair of spines and posterodorsally with a sharp triangular elevation. Postpetiole without spongiform tissue but with strong lateral alar prominences which appear in profile as thick longitudinal crests. In dorsal

view the postpetiole very broad, spanning almost all of the basal width of the first gastral tergite. Basigastral costulae present, usually fine dense and distinctive, only rarely reduced in intensity. Petiole and postpetiole densely reticulate-punctate to granular. Petiole, postpetiole and first gastral tergite without standing hairs of any description, only with minute appressed sparse pubescence. Colour yellow, the appendages paler than the body.

MATERIAL EXAMINED

Zambia: Kipushi (*H. S. Evans*). **Zimbabwe**: Gwebi (*K. J. Wilson*), Chishawasha (*A. Watsham*). **South Africa**: Natal, St Lucia Lake (*J. C. Faure*).

Microdaceton tibialis Weber

(Figs 79, 81)

Microdaceton tibialis Weber, 1952*a*: 30, fig. 25. Holotype worker, ZAIRE: 37 km N. of Stanleyville (= Kisangani), lat. 0°45′N, long. 25°15′E, 15.iii.1948, rain forest, no. 2218 (*N. A. Weber*) (AMNH) [examined].

WORKER. TL 3·2–3·8, HL 0·88–0·98, HW 0·80–0·90, CI 88–92, ML 0·56–0·66, MI 63–69, SL 0·62–0·72, SI 75–81, PW 0·38–0·47, AL 0·78–0·90 (10 measured).

Answering to the description of *exornatum* in all major features, *tibialis* is distinguished as follows.

exornatum	*tibialis*
Mandibles relatively shorter, MI 55–61.	Mandibles relatively longer, MI 63–69.
Scapes relatively shorter, SI 66–70.	Scapes relatively longer, SI 75–81.
Postpetiole in dorsal view spanning almost the entire basal width of the first gastral tergite (Fig. 80).	Postpetiole in dorsal view spanning 0·70 or less of the basal width of the first gastral tergite (Fig. 81).
Width of postpetiole in dorsal view 0·60–0·65× maximum width of first gastral tergite.	Width of postpetiole in dorsal view 0·46–0·56× maximum width of first gastral tergite.
Basigastral costulae usually dense and distinct, rarely reduced in intensity.	Basigastral costulae absent, at most with faint shagreening near gastral base.
Body colour yellow.	Body colour black to blackish brown.
Laterodorsal cephalic tubercles large and conspicuous.	Laterodorsal cephalic tubercles vestigial to absent.
Petiolar armament spiniform.	Petiolar armament dentiform.
Propodeal dorsum with reticulate-punctate sculpture.	Propodeal dorsum without reticulate-punctate sculpture.

MATERIAL EXAMINED

Ivory Coast: Man, Mt Tonkoui (*V. Mahnert & J.-L. Perret*). **Ghana**: Mampong (*P. Room*); Bunso (*D. Leston*). **Zaire**: Kisangani (*N. A. Weber*).

Acknowledgements

I would like to express my thanks and gratitude to the following people, who have greatly facilitated this study by lending me types and other material and who have given me free access to their collections and other data: Dr Cesare Baroni Urbani (NMB); Dr Claude Besuchet (MHN); Professor William L. Brown Jr (Cornell University, Ithaca); Dr Jean Decelle (MRAC); Mrs Marjorie Favreau (AMNH); Dr Max Fischer (NMV); Dr Dorothy A. Jackson (Oxford University); Dr Frank Koch (MNHU); Dr Egidio Mellini (IE); Mr Alfred F. Newton (MCZ); Dr Jeno Papp (TM); Dr Roberto Poggi (MCSN); Dr Wojciech Pulawski (CAS); Dr David R. Smith (USNM); Dr George Terron (ENSA); Dr Janine C. Weulersse (MNHN); Dr V. B. Whitehead (SAM).

References

Arnold, G. 1914. Nest-changing migrations of two species of ants. *Proceedings of the Rhodesia Scientific Association, Bulawayo* **13**: 25–32.

—— 1917. A monograph of the Formicidae of South Africa, part 3. *Annals of the South African Museum* **14**: 271–402.

—— 1926. A monograph of the Formicidae of South Africa, supplement. *Annals of the South African Museum* **23**: 191–295.

—— 1948. New species of African Hymenoptera, no. 8. *Occasional papers of the National Museum of Southern Rhodesia* **14**: 213–250, 23 figs.

—— 1949. New species of African Hymenoptera, no. 9. *Occasional papers of the National Museum of Southern Rhodesia* **15**: 261–275, 16 figs.

Bernard, F. 1952. La réserve naturelle intégrale du Mt Nimba, part 11. Hyménoptères, Formicidae. *Mémoires de l'Institute Français d'Afrique Noire* **19**: 165–270, 3 pls, 15 figs.

Bolton, B. 1971. Two new subarboreal species of the ant genus *Strumigenys* from West Africa. *Entomologist's Monthly Magazine* **107**: 59–64, 3 figs.

—— 1972. Two new species of the ant genus *Epitritus* from Ghana, with a key to the world species. *Entomologist's Monthly Magazine* **107**: 205–208, 4 figs.

—— 1973. The ant genera of West Africa: a synonymic synopsis with keys. *Bulletin of the British Museum Natural History* (Entomology) **27**: 317–368, 1 fig.

—— 1974. A revision of the palaeotropical arboreal ant genus *Cataulacus* F. Smith. *Bulletin of the British Museum Natural History* (Entomology) **30**: 1–105, 41 figs.

—— 1976. The ant tribe Tetramoriini. Constituent genera, review of smaller genera and revision of *Triglyphothrix* Forel. *Bulletin of the British Museum Natural History* (Entomology) **34**: 281–379, 73 figs.

—— 1980. The ant tribe Tetramoriini. The genus *Tetramorium* Mayr in the Ethiopian Zoogeographical region. *Bulletin of the British Museum Natural History* (Entomology) **40**: 193–384, 145 figs.

—— 1981*a*. A revision of the ant genera *Meranoplus* F. Smith, *Dicroaspis* Emery and *Calyptomyrmex* Emery in the Ethiopian zoogeographical region. *Bulletin of the British Museum Natural History* (Entomology) **42**: 43–81, 44 figs.

—— 1981*b*. A revision of six minor genera of Myrmicinae in the Ethiopian zoogeographical region. *Bulletin of the British Museum Natural History* (Entomology) **43**: 245–307, 55 figs.

—— 1982. Afrotropical species of the myrmicine ant genera *Cardiocondyla, Leptothorax, Melissotarsus, Messor* and *Cataulacus*. *Bulletin of the British Museum Natural History* (Entomology) **45**: 307–370, 43 figs.

Brown, W. L., Jr 1948. A preliminary generic revision of the higher Dacetini. *Transactions of the American Entomological Society* **74**: 101–129, 2 figs.

—— 1949*a*. Revision of the ant tribe Dacetini 1. Fauna of Japan, China and Taiwan. *Mushi. Fukuoka Entomological Society* **20**: 1–25, 2 figs.

—— 1949*b*. Revision of the ant tribe Dacetini 3. *Epitritus* Emery and *Quadristruma* new genus. *Transactions of the American Entomological Society* **75**: 43–51, 1 fig.

—— 1949*c*. Revision of the ant tribe Dacetini 4. Some genera properly excluded from the Dacetini, with the establishment of the Basicerotini, new tribe. *Transactions of the American Entomological Society* **75**: 83–96.

—— 1950*a*. Revision of the ant tribe Dacetini 2. *Glamyromyrmex* Wheeler and closely related small genera. *Transactions of the American Entomological Society* **76**: 27–36, 2 figs.

—— 1950*b*. Preliminary descriptions of seven new species of the dacetine ant genus *Smithistruma* Brown. *Transactions of the American Entomological Society* **76**: 37–45, p. 3.

—— 1950*c*. Supplementary notes on the feeding of dacetine ants. *Bulletin of the Brooklyn Entomological Society* **45**: 87–89.

—— 1952*a*. Revision of the ant genus *Serrastruma*. *Bulletin of the Museum of Comparative Zoology at Harvard College* **107**: 67–86.

—— 1952*b*. The dacetine ant genus *Mesostruma* Brown. *Transactions of the Royal Society of South Australia* **75**: 9–13, 1 fig.

—— 1953*a*. Revisionary studies in the ant tribe Dacetini. *The American Midland Naturalist* **50**: 1–137, 10 figs, 3 pls.

—— 1953*b*. A revision of the dacetine ant genus *Orectognathus*. *Memoirs of the Queensland Museum* **13**: 84–104. 3 figs.

—— 1954. The ant genus *Strumigenys* Fred. Smith in the Ethiopian and Malagasy regions. *Bulletin of the Museum of Comparative Zoology at Harvard College* **112**: 1–34, 1 fig.

—— 1958. A new Japanese species of the dacetine ant genus *Epitritus*. *Mushi. Fukuoka Entomological Society* **31**: 69–72, 3 figs.

—— 1959*a*. The Neotropical species of the ant genus *Strumigenys* F. Smith: group of *gundlachi* (Roger). *Psyche, a Journal of Entomology* **66**: 37–52, 9 figs.

—— 1959*b*. A revision of the dacetine ant genus *Neostruma*. *Breviora, Museum of Comparative Zoology* **107**: 1–13, 4 figs.
—— 1959*c*. Some new species of dacetine ants. *Breviora, Museum of Comparative Zoology* **108**: 1–11, 5 figs.
—— 1960. A new African ant of the genus *Strumigenys*, tribe Dacetini. *Entomological News, Academy of Natural Sciences, Philadelphia* **71**: 207.
—— 1962*a*. A new ant of the genus *Epitritus* from south of the Sahara. *Psyche, a Journal of Entomology* **69**: 77–80, 4 figs.
—— 1962*b*. The Neotropical species of the ant genus *Strumigenys* Fr. Smith: synopsis and key to species. *Psyche, a Journal of Entomology* **69**: 238–267, 30 figs.
—— 1964. The ant genus *Smithistruma*: a first supplement to the world revision. *Transactions of the American Entomological Society* **89**: 183–200, pl. 16.
—— 1972. *Asketogenys acubecca*, a new genus and species of dacetine ant from Malaya. *Psyche, a Journal of Entomology* **79**: 23–26, 2 figs.
—— 1973*a*. A new species of *Miccostruma* from West Africa, with notes on the genus. *Journal of the Kansas Entomological Society* **46**: 32–35, 2 figs.
—— 1973*b*. A comparison of the Hylean and Congo-West African rain forest ant faunas, pp. 161–185. *In* Meggers, B. J., Ayensu, E. S. & Duckworth, W. D., *Tropical forest ecosystems in Africa and South America, a review*. Washington, D.C.
—— 1973*c*. The Indo-Australian species of the ant genus *Strumigenys*: groups of *horvathi, mayri* and *wallacei*. *Pacific Insects* **15**: 259–269, 8 figs.
—— 1976. *Cladarogenys* genus nov. *Pilot Register of Zoology*, Cards 33–34.
Brown, W. L., Jr & Boisvert, R. G. 1978. The dacetine ant genus *Pentastruma*. *Psyche, a Journal of Entomology* **85**: 201–207, 4 figs.
Brown, W. L., Jr & Carpenter, F. M. 1978. A restudy of two ants from the Sicilian amber. *Psyche, a Journal of Entomology* **85**: 417–423, 4 figs.
Brown, W. L., Jr & Kempf, W. W. 1960. A world revision of the ant tribe Basicerotini. *Studia Entomologica, Revista Internacional de Entomologica* **3**: 161–250, 63 figs.
—— & —— 1969. A revision of the Neotropical dacetine ant genus *Acanthognathus*. *Psyche, a Journal of Entomology* **76**: 87–109, 11 figs.
Brown, W. L., Jr & Wilson, E. O. 1959. The evolution of the dacetine ants. *Quarterly Review of Biology* **34**: 278–294, 33 figs.
Brown, W. L., Jr & Yasumatsu, K. 1951. On the publication date of *Polyhomoa itoi* Azuma. *Mushi. Fukuoka Entomological Society* **22**: 93–95.
Carlin, N. F. 1981. Polymorphism and division of labor in the dacetine ant *Orectognathus versicolor*. *Psyche, a Journal of Entomology* **88**: 231–244, 4 figs.
Creighton, W. S. 1937. Notes on the habits of *Strumigenys*. *Psyche, a Journal of Entomology* **44**: 97–109.
Dejean, A. 1980*a*. Le comportement de prédation de *Serrastruma serrula* (Santschi) 1. Capacité de detection des ouvrières, analyse des phases comportementales. *Annales des Sciences naturelles Zoologie et Biologie animale* (13) **2**: 131–143, 8 figs.
—— 1980*b*. Le comportement de prédation de *Serrastruma serrula* (Santschi) 2. Analyse séquentielle. *Annales des Sciences naturelles Zoologie et Biologie animale* (13) **2**: 145–150.
Donisthorpe, H. St J. K. 1916. *Epitritus wheeleri* n. sp., an ant new to science; with notes on the genus *Epitritus* Emery. *The Entomologist's Record and Journal of Variation* **28**: 121–122.
—— 1915. *British Ants, their life-history and classifications*. 379 pp., 18 pls., 92 figs. Plymouth.
—— 1945. New species of ants from the island of Mauritius. *Annals and Magazine of Natural History* (11) **12**: 776–784.
—— 1948. A third instalment of the Ross collection of ants from New Guinea. *Annals and Magazine of Natural History* (11) **14** (1947): 589–604, 1 fig.
Emery, G. 1869*a*. Formicidarum italicorum species duae novae. *Bullettino della Società Entomologica Italiana* **1**: 135–137, 1 fig.
—— 1869*b*. Enumerazione dei formicidi che rinvengonsi nei contorni di Napoli, con descrizioni di specie nuove o meno conosciute. *Annali dell'Accademia degli Aspiranti Naturalisti* (2) **2**: 1–26, pl. 1.
—— 1890. Studii sulle formiche della fauna Neotropica. *Bullettino della Società Entomologica Italiana* **22**: 38–80, pls 5–9.
—— 1895*a*. Voyage de M. E. Simon dans l'Afrique australe (janvier-avril 1893). Formicides. *Annales de la Société Entomologique de France* **64**: 15–56, pl. 2.
—— 1895*b*. Beiträge zur Kenntniss der nordamerikanischen Ameisenfauna. *Zoologische Jahrbücher, Abteilung für Systematik* **8**: 257–360, pl. 8.

Forel, A. 1902. *In* Wasmann, E., Neues über die zusammengesetzten Nester und gemischten Kolonien der Ameisen. *Allgemeine Zeitschrift für Entomologie* **7**: 293–298, pl. 1.
—— 1904*a*. Miscellanea myrmécologiques. *Revue Suisse de Zoologie* **12**: 1–52, figs.
—— 1904*b*. Note sur les fourmis du Musée Zoologique de l'Académie Impériale des Sciences à St Pétersbourg. *Annuaire du Musée Zoologique de l'Académie Impériale des Sciences de St Pétersbourg* **8**: 368–388.
—— 1905. Ameisen aus Java. Gesammelt von Prof. Karl Kraepelin 1904. *Mitteilungen aus dem Naturhistorischen Museum Hamburg* **22**: 1–26.
—— 1910. Ameisen aus der Kolonie Erythräa. Gesammelt von Prof Dr K. Escherich (nebst einigen in West-Abessinien von Herrn A. Ilg gesammelten Ameisen). *Zoologische Jahrbücher, Abteilung für Systematik* **29**: 243–274.
—— 1912. The Percy Sladen Trust expedition to the Indian Ocean in 1905, no. 11. Fourmis des Seychelles et des Aldabras, reçues de M Hugh Scott. *Transactions of the Linnean Society of London* (2) **15**: 159–167.
—— 1913*a*. Wissenschaftliche Ergebnisse einer Forschungsreise nach Ostindien, ausgeführt im Aufträge der Kgl. Preuss. Akademie der Wissenschaften zu Berlin von H. v. Buttel-Reepen, 2. Ameisen aus Sumatra, Java, Malacca und Ceylon. Gesammelt von Herrn Prof. Dr v. Buttel-Reepen in den Jahren 1911–1912. *Zoologische Jahrbücher, Abteilung für Systematik* **36**: 1–148, figs.
—— 1913*b*. Fourmis de Rhodesia, etc. récoltées par M Arnold, le Dr H. Brauns et K. Fikendey. *Annales de la Société Entomologique de Belgique* **57**: 108–147.
—— 1913*c*. Ameisen aus Rhodesia, Kapland usw. Gesammelt von Herrn G. Arnold, Dr H. Brauns und Anderen. *Deutsche Entomologische Zeitschrift* **1913** (Beiheft): 203–225.
—— 1913*d*. Formicides du Congo Belge récoltés par MM Bequaert, Luja, etc. *Revue Zoologique Africaine* **2**: 306–351.
—— 1916. Fourmis du Congo et d'autres provenances récoltées par MM Hermann Kohl, Luja, Mayné, etc. *Revue Suisse de Zoologie* **24**: 397–460, 7 figs.
Godfrey, R. 1907. *Notes on the animal life of the hothouse of the Royal Botanic Garden, Edinburgh* **17**: 99–103.
Hölldobler, B. 1981. Trail communication in the dacetine ant *Orectognathus versicolor. Psyche, a Journal of Entomology* **88**: 245–251, 6 figs.
Kempf, W. W. 1960. Miscellaneous studies on Neotropical ants. *Studia Entomologica, Revista Internacional de Entomologia* **3**: 417–466, 47 figs.
—— 1972. Catálogo abreviado das formigas de Região Neotropical. *Studia Entomologica, Revista Internacional de Entomologia* **15**: 3–344.
Kennedy, C. H. & Schramm, M. M. 1933. A new *Strumigenys* with notes on Ohio Species. *Annals of the Entomological Society of America* **26**: 95–104, 15 figs.
Krombein, K. V., Hurd, P. D., Smith, D. R. & Burks, B. D. 1979. *Catalogue of Hymenoptera in America north of Mexico*, **2** Apocrita (Aculeata): 1199–2209. Washington, D.C.
Mann, W. M. 1921. The ants of the Fiji Islands. *Bulletin of the Museum of Comparative Zoology at Harvard College* **64**: 401–499, 38 figs.
Mayr, G. 1901. Sudafrikanische Formiciden, gesammelt von Dr Hans Brauns. *Annalen des K. K. Naturhistorischen Hofmuseums Wien* **16**: 1–30, 2 pls.
Menozzi, C. 1942. Formiche dell'isola Fernando Poo e del territorio del Rio Muni (Guinea Spagnola) 24. Beitrag zu den Wissenschaftlichen Ergebnissen der Forschungsreise H. Eidmann nach Spanisch-Guinea, 1939 bis 1940. *Zoologischer Anzeiger* **140**: 164–182, 4 figs.
Patrizi, S. 1946. Contribuzioni alla conoscenza delle Formiche e dei mirmecofili dell'Africa Orientale, 1. Descrizione di un nuovo genere e di una nuova specie di Formiche del Kenya. *Bollettino dell'Istituto di Entomologia della Università di Bologna* **15**: 292–296, 2 figs.
—— 1947. Contribuzioni alla conoscenza delle Formiche e dei mirmecofili dell'Africa Orientale. *Bollettino dell'Istituto di Entomologia della Università di Bologna* **16**: 219–221, 2 figs.
Roger, J. 1862. Einige neue exotische Ameisen-Gattungen und Arten. *Berliner Entomologische Zeitschrift* **6**: 233–254, pl. 1.
Santschi, F. 1910*a*. Formicides nouveaux ou peu connus du Congo Français. *Annales de la Société Entomologique de France* **78** (1909): 349–400, 20 figs.
—— 1910*b*. Nouvelles fourmis d'Afrique. *Annales de la Société Entomologique de France* **79**: 351–369, figs.
—— 1913*a*. Clé analytique des Fourmis africaines du genre *Strumigenys* Sm. *Bulletin de la Société Entomologique de France* **1913**: 257–259.
—— 1913*b*. Genre nouveau et espèce nouvelle de formicides. *Bulletin de la Société Entomologique de France* **1913**: 478.

—— 1914*a*. *Voyage de Ch. Alluaud et R. Jeannel en Afrique Orientale (1911–1912)*. Résultats scientifiques. Insectes Hyménoptères 2. Formicidae: 41–148. 30 figs, 2 pls. Paris.
—— 1914*b*. Formicides de l'Afrique occidentale et australe du voyage de M le Professeur F. Silvestri. *Bollettino del Laboratoria di Zoologia generale e agraria della R. Scuola superiore d'Agricoltura in Portici* **8**: 307–385, 34 figs.
—— 1914*c*. Meddelanden från Göteborgs Musei Zoologiska Afdeling no. 3. Fourmis du Natal et du Zululand récoltées par le Dr I. Trägårdh; avec un appendice. Notes biologiques par I. Trägårdh. *Göteborgs Kungl. Vetenskaps och Vitterhets Samhälles Handlingar* **15**: 1–47, 10 figs.
—— 1915. Nouvelles fourmis d'Afrique. *Annales de la Société Entomologique de France* **84**: 244–282, 15 figs.
—— 1919. Nouvelles fourmis du Congo Belge du Musée du Congo Belge à Tervuren. *Revue Zoologique Africaine* **7**: 79–91.
—— 1923. Descriptions de nouveaux Formicides éthiopiens et notes diverses, 1. *Revue de Zoologie et de Botanique Africaines* **11**: 259–295, 5 figs.
Signoret, M. V. 1847. Description de deux Hémiptères-Homoptères, tribu des octicelles, groupe des cicadides. *Annales de la Société Entomologique de France* (2) **5**: 293–296.
Smith, F. 1860. Descriptions of new genera and species of exotic Hymenoptera. *Journal of Entomology, descriptive and geographical* **1**: 65–84, pl. 4.
—— 1865. Descriptions of new species of hymenopterous insects from the islands of Sumatra, Sula, Gilolo, Salwatty, and New Guinea. *Journal of the Linnean Society of London* **8**: 61–94, pl. 4.
Stitz, H. 1910. Westafrikanische Ameisen 1. *Mitteilungen aus dem Zoologischen Museum in Berlin* **5**: 125–151, 11 figs.
Szabo, J. 1909. De duabus speciebus novis Formicidarum generis *Epitritus* Em: *Archivum Zoologicum* **1**: 1-2, 2 figs.
Taylor, R. W. 1965. A second African species of the dacetine ant genus *Codiomyrmex*. *Psyche, a Journal of Entomology* **72**: 225–228, 2 figs.
—— 1968*a*. Notes on the Indo-Australian basicerotine ants. *Australian Journal of Zoology* **16**: 333–348, 15 figs.
—— 1968*b*. A new Malayan species of the ant genus *Epitritus* and a related new genus from Singapore. *Journal of the Australian Entomological Society* **7**: 130–134, 4 figs.
—— 1973. Ants of the Australian genus *Mesostruma* Brown. *Journal of the Australian Entomological Society* **12**: 24–38, 6 pls.
—— 1980. New Australian ants of the genus *Orectognathus*, with summary description of the twenty-nine known species. *Australian Journal of Zoology* **27** (1979): 773–788, 12 figs.
Wasmann, E. 1918. Ueber die von v. Rothkirch 1912 in Kamerun gesammelten Myrmekophilen (227 Beitrag zur Kenntnis der Myrmekophilen). *Entomologische Mitteilungen, Berlin* **7**: 135–149, pl. 2.
Weber, N. A. 1934. Notes on Neotropical ants, including the descriptions of new forms. *Revista de Entomologia* **4**: 22–59, 14 figs.
—— 1943. Ants of the Imatong Mountains, Anglo-Egyptian Sudan. *Bulletin of the Museum of Comparative Zoology at Harvard College* **93**: 261–389, 16 pls.
—— 1952*a*. Studies of African Myrmicinae 1. *American Museum Novitates* no. 1548: 1–32, 36 figs.
—— 1952*b*. Biological notes on Dacetini. *American Museum Novitates* no. 1554: 1–7.
Wesson, L. G. 1936. Contributions toward the biology of *Strumigenys pergandei*: a new food relationship among ants. *Entomological News, Academy of Natural Sciences, Philadelphia* **47**: 171–174.
Wesson, L. G. & Wesson, R. G. 1939. Notes on *Strumigenys* from southern Ohio, with description of six new species. *Psyche, a Journal of Entomology* **46**: 91–112.
Wheeler, W. M. 1915. Two new genera of myrmicine ants from Brazil. *Bulletin of the Museum of Comparative Zoology at Harvard College* **59**: 483–491, 2 figs.
—— 1916. Ants collected in Trinidad by Professor Roland Thaxter, Mr F. W. Urich, and others. *Bulletin of the Museum of Comparative Zoology at Harvard College* **60**: 323–330, 1 fig.
—— 1922. Ants of the Belgian Congo, parts 1–8. *Bulletin of the American Museum of Natural History* **45**: 1–1139, 23 pls, 76 figs.
—— 1928. Ants collected by Professor F. Silvestri in China. *Bollettino del Laboratorio di Zoologia generale e agraria del R. Istituto superiore agrario di Portici* **22**: 1–38, 3 figs.
—— 1929. Ants collected by Professor F. Silvestri in Formosa, the Malay Peninsula and the Philippines. *Bollettino del Laboratorio di Zoologia generale e agraria del R. Istituto superiore agrario di Portici* **24**: 27–64, 7 figs.
—— 1933. An ant new to the fauna of the Hawaiian Islands. *Proceedings of the Hawaiian Entomological Society* **8**: 275–278, 1 fig.

Wheeler, G. C. & Wheeler, J. 1954. The ant larvae of the myrmicine tribes Basicerotini and Dacetini. *Psyche, a Journal of Entomology* **61**: 111–145.

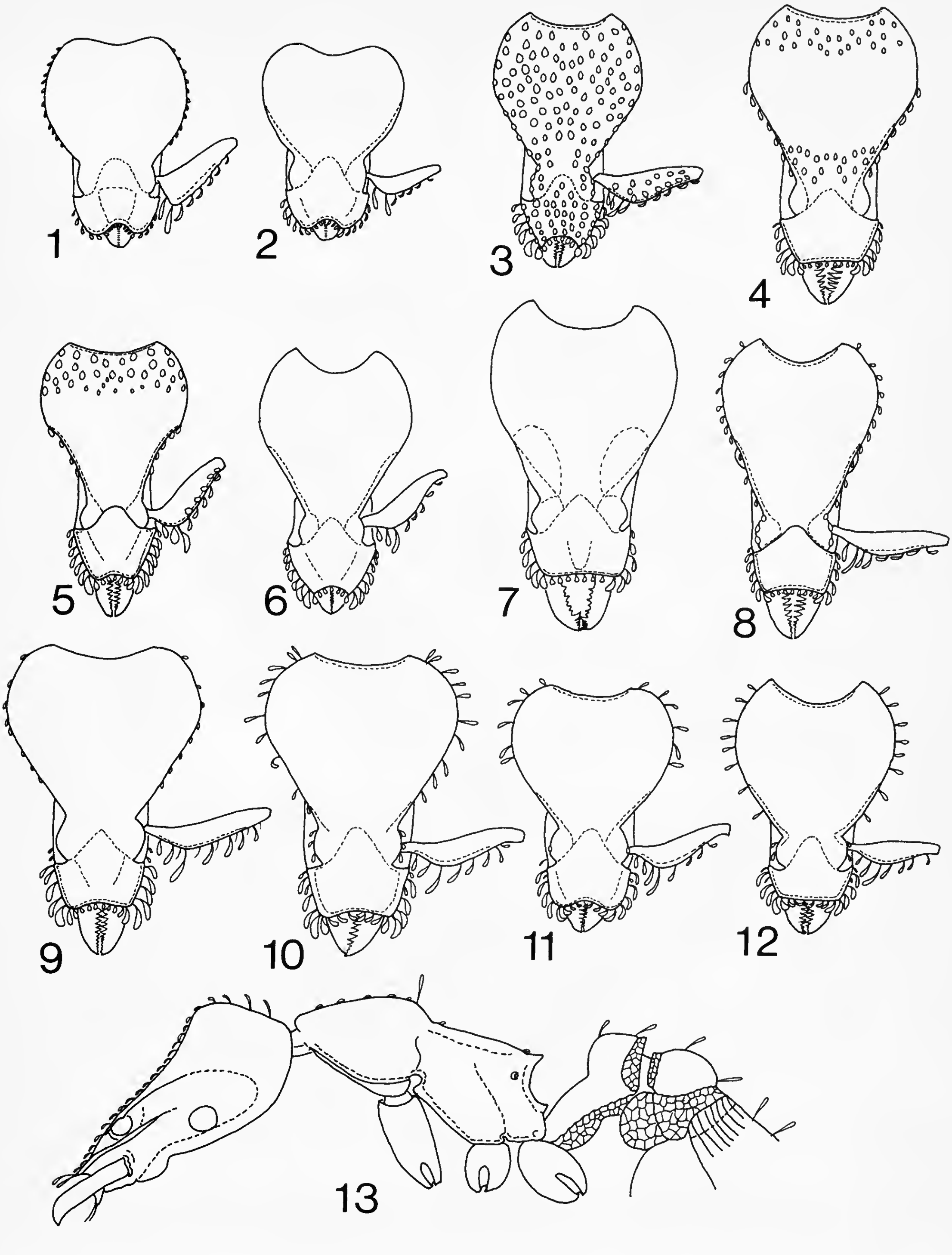
Wilson, E. O. 1950. Notes on the food habits of *Strumigenys louisianae* Roger. *Bulletin of the Brooklyn Entomological Society* **54**: 85–86.

—— 1954. The ecology of some North American dacetine ants. *Annals of the Entomological Society of America* **46** (1953): 479–495.

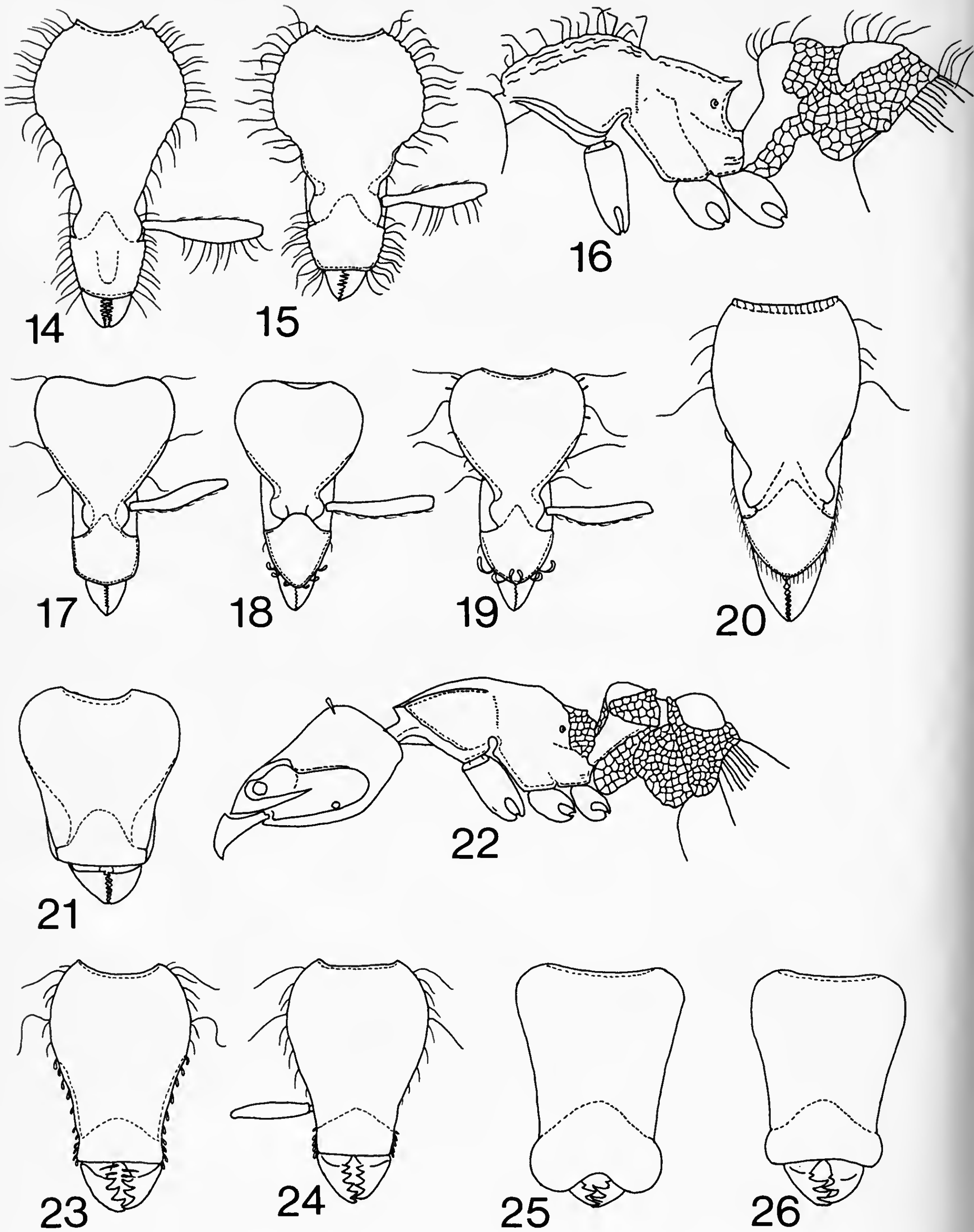
—— 1962. Behaviour of *Daceton armigerum* (Latreille), with a classification of self-grooming movements in ants. *Bulletin of the Museum of Comparative Zoology at Harvard College* **127**: 401–422, 2 figs.

Wilson, E. O. & Taylor, R. W. 1967. The ants of Polynesia. *Pacific Insects Monograph* **14**: 1–109, 84 figs.

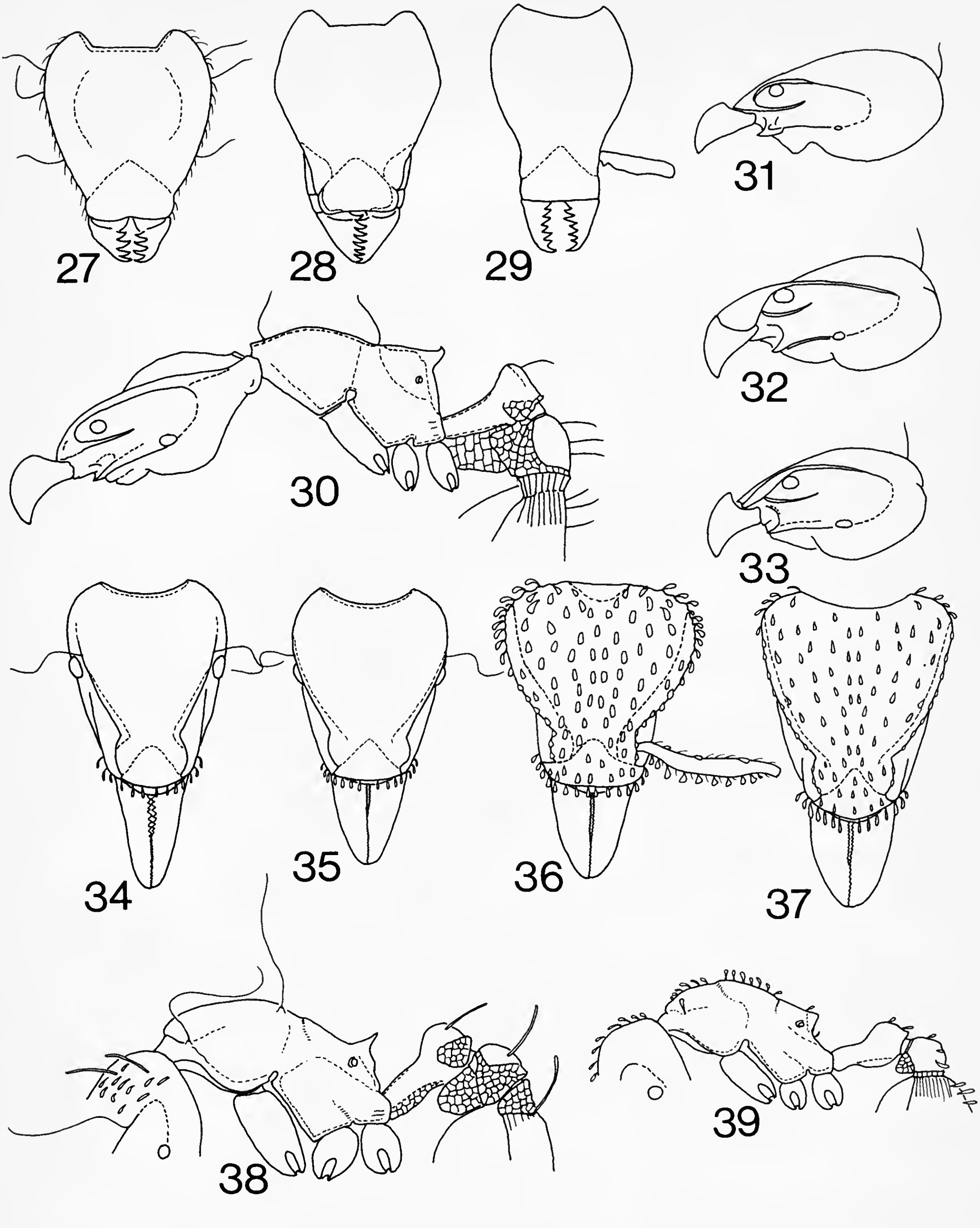
Wilson, E. O. & Brown, W. L., Jr 1956. New parasitic ants of the genus *Kyidris*, with notes on ecology and behaviour. *Insectes Sociaux* **3**: 439–454, 5 figs.



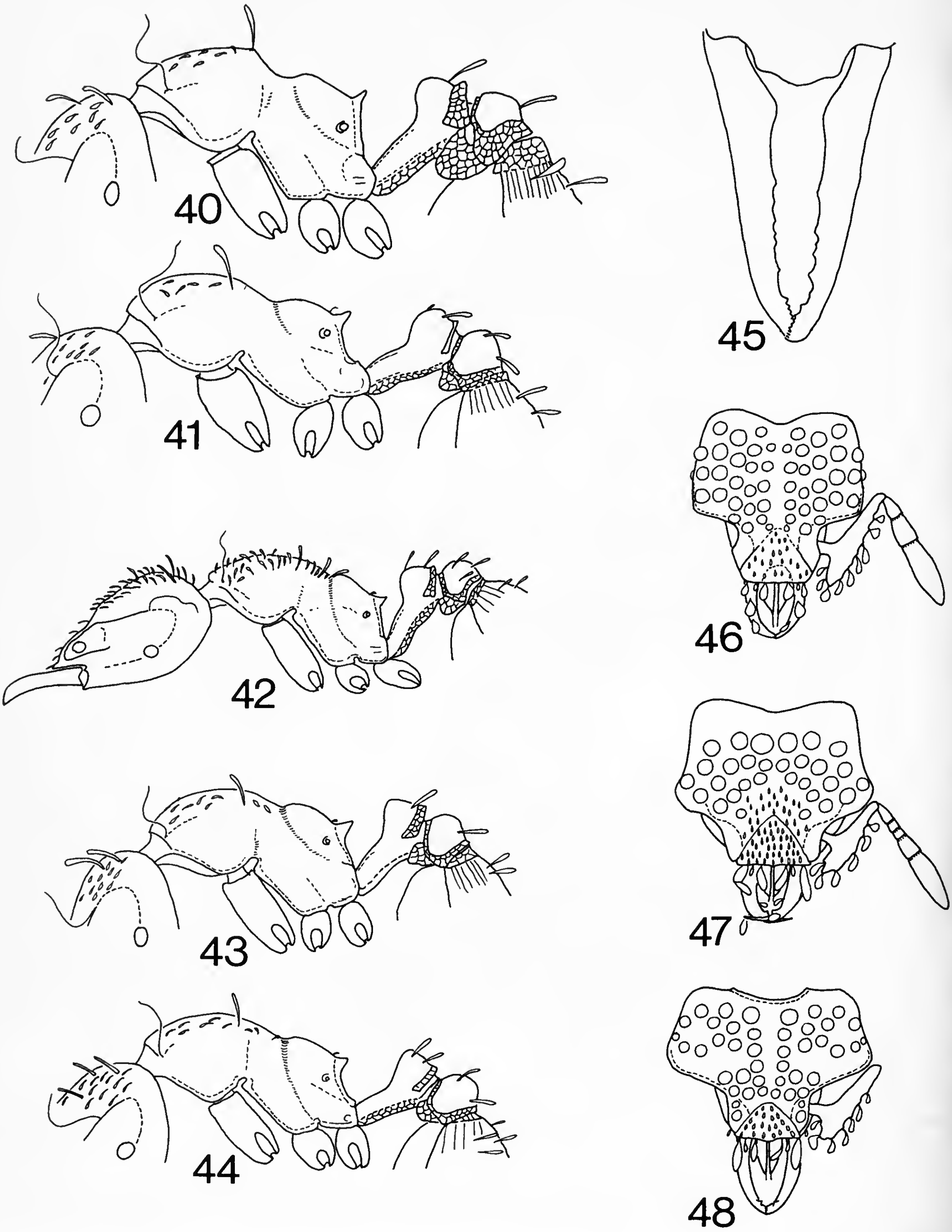
Figs 1–13 *Smithistruma* workers. 1–12, heads of (1) *fulda*, (2) *ninda*, (3) *sharra*, (4) *behasyla*, (5) *chyatha*, (6) *impidora*, (7) *terroni*, (8) *emarginata*, (9) *datissa*, (10) *truncatidens*, (11) *gatuda*, (12) *hensekta*. 13, profile of *truncatidens*. Fringing pilosity only indicated except in 3–6.



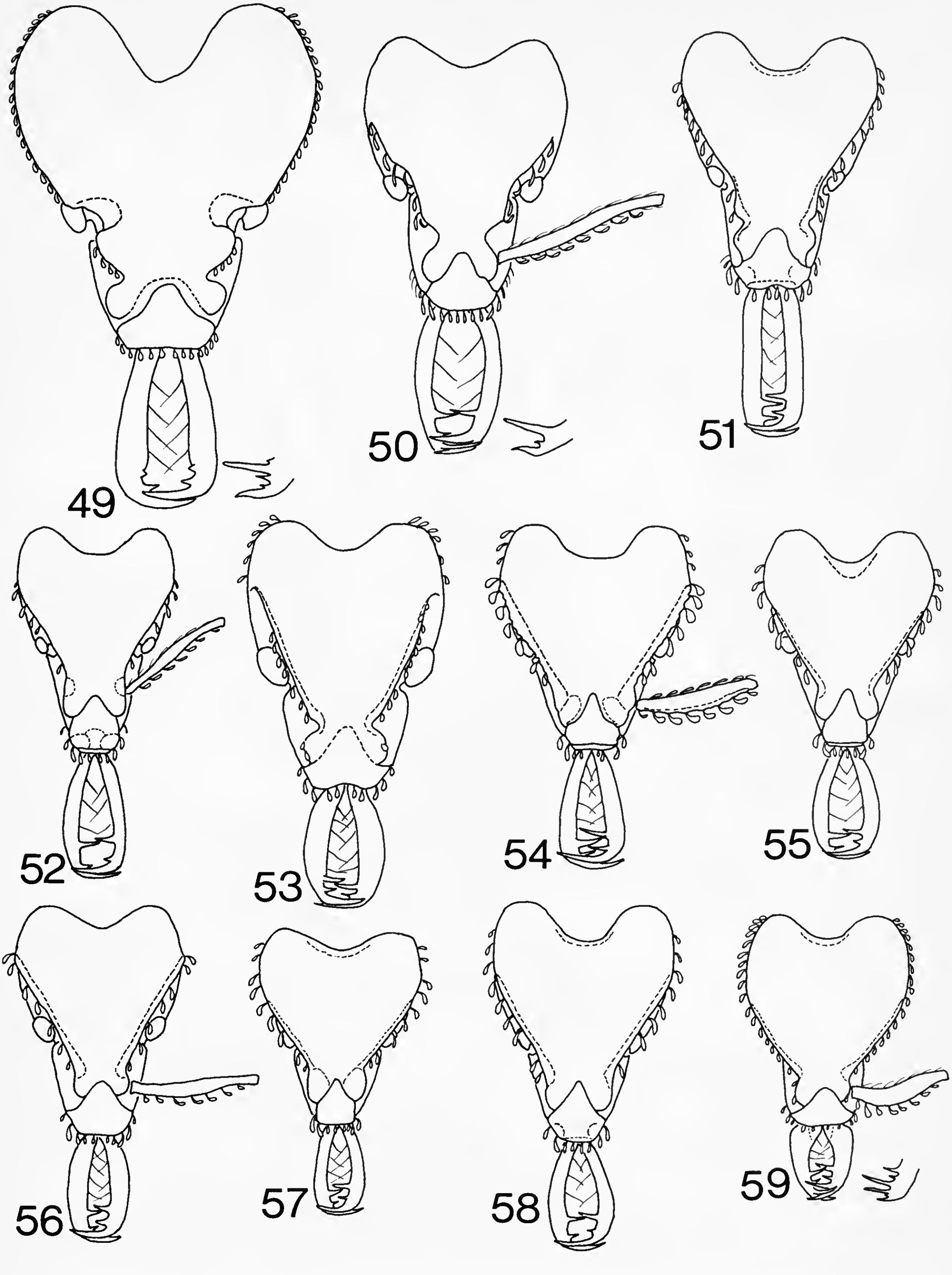
Figs 14–26 14–20, *Smithistruma* workers. 14, 15, heads of (14) *minkara*, (15) *enkara*. 16, alitrunk and pedicel of *kerasma*. 17–20, heads of (17) *rusta*, 18 *anarta*, (19) *oxysma*, (20) *vodensa*. 21, 22, *Trichoscapa* workers. 21, head of *membranifera*, 22, profile of *membranifera*. 23–26, *Glamyromyrmex* workers, heads of (23) *crypturus*, (24) *sistrurus*, (25) *dagon*, (26) *sahurus*. Fringing pilosity only indicated.



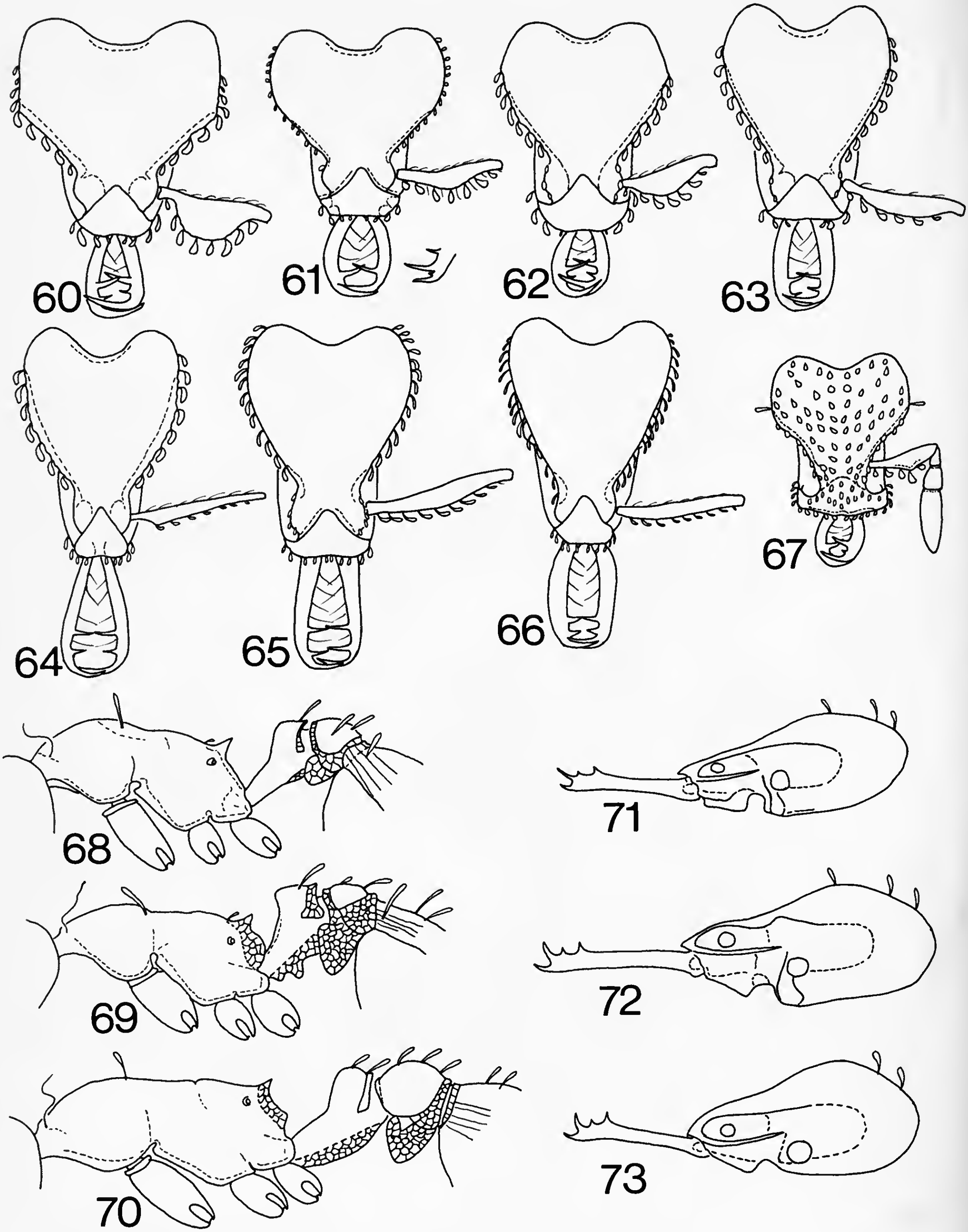
Figs 27–39 27–33. *Glamyromyrmex* workers. 27–29, heads of (27), *africanus*, (28) *ravidurus*, (29) *tukultus*. 30, profile of *tetragnathus*. 31–33, profile of head of (31) *thuvidus*, (32) *dagon*, (33) *sahurus*. 34–39. *Serrastruma* workers. 34–37, heads of (34) *ludovici*, (35) *dotaja*, (36) *geoterra*, (37) *maynei*. 38–39, alitrunk and pedicel of (38) *dotaja*, (39) *miccata*. Fringing pilosity only indicated except in 36, 37.



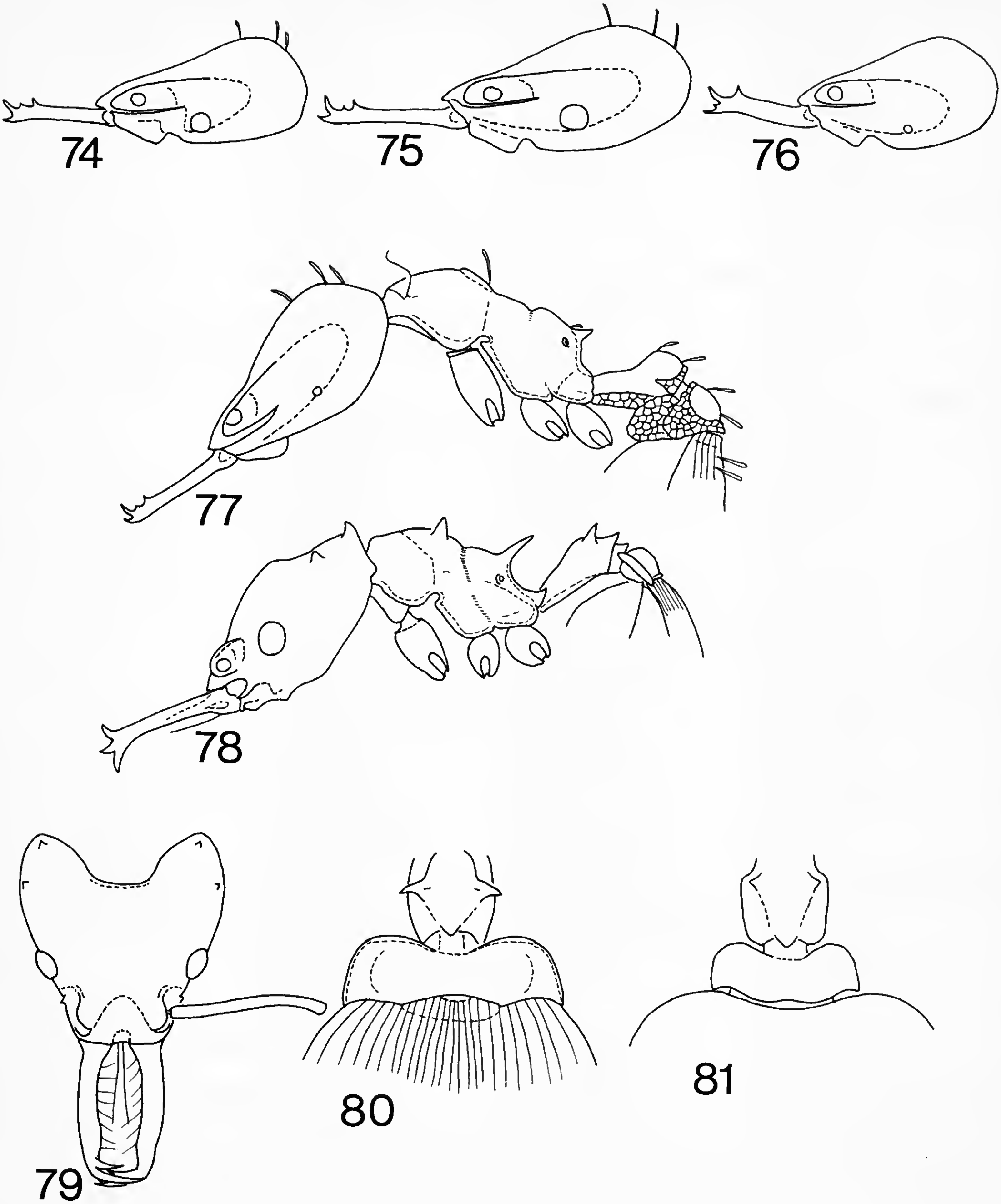
Figs 40–48 40–44. *Serrastruma* workers, alitrunk and pedicel of (40) *simoni*, (41) *ludovici*, (42) *serrula*, (43) *concolor*, (44) *lujae*. 45, mandibles of *Cladarogenys lasia* worker (from Brown, 1976). 46–48. *Epitritus* workers, heads of (46) *minimus*, (47) *roomi*, (48) *laticeps*.



Figs 49–59 *Strumigenys* workers. Heads of (49) *cacaoensis*, (50) *sarissa*, (51) *rogeri*, (52) *vazerka*, (53) *pretoriae*, (54) *xenohyla*, (55) *dyshaula*, (56) *totyla*, (57) *relahyla*, (58) *petiolata*, (59) *pallestes*. Fringing pilosity only indicated.



Figs 60–73 60–66 *Strumigenys* workers. Heads of (60) *tetraphanes*, (61) *katapelta*, (62) *spathoda*, (63) *omalyx*, (64) *korahyla*, (65) *havilandi*, (66) *zandala*. 67, head of *Quadristruma emmae* worker. 68–73 *Strumigenys* workers. 68–70, alitrunk and pedicel of (68) *adrasora*, (69) *mesahyla*, (70) *havilandi*. 71–73, profile of head of (71) *petiolata*, (72) *rogeri*, (73) *xenohyla*. Fringing pilosity only indicated except in 67.



Figs 74–81 74–77 *Strumigenys* workers. 74–76, profile of head of (74) *relahyla*, (75) *scotti*, (76) *katapelta*. 77, profile of *murshila*. 78–81 *Microdaceton* workers. 78, profile of *exornatum*. 79, head of *tibialis*. 80–81, petiole, postpetiole and base of first gastral tergite in dorsal view of (80) *exornatum*, (81) *tibialis*.

Index

Synonyms are in *italics*.

on

Titles to be published in Volume 46

The generic and tribal classification of spore-feeding Thysanoptera (Phlaeothripidae: Idolothripinae).
By L. A. Mound & J. M. Palmer.

A revision of the Afrotropical mole-crickets (Orthoptera: Gryllotalpidae).
By B. C. Townsend.

Key to the genera of galerucine beetles of New Guinea, with a review of *Sastra* and related new taxa (Chrysomelidae).
By Sharon L. Shute.

The Afrotropical dacetine ants (Formicidae).
By Barry Bolton.

Photoset by Rowland Phototypesetting Ltd, Bury St Edmunds, Suffolk
Printed in Great Britain by Henry Ling Ltd., Dorchester

X